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Design of Builders' Castings

At a conference arranged by the Scottish Committee of the Council of Industrial Design on design policy for Scottish ironfounders, very wisely, information was forthcoming from an entirely different industry—that of furniture manufacture. It is a field where—at least in Europe—this country led. Yet the lecturer, Mr. Leslie Julius (a London manufacturer) related how with the reopening of the market in 1947, the initial heavy demand was met by pre-war designs as an interim measure. In 1948, two British designers, working in co-operation, won an international competition for low-cost furniture in New York. These the lecturer's company engaged as consultants to survey not only the firm's productions, but also printing, packaging and advertising. The rest was just a well-authenticated success story.

Mr. Julius drew up ten basic rules for a design policy which are so good that we quote from our report of the conference:—

(1) Recognize your own lack of design policy and lack of knowledge; (2) select a member of the Board with full responsibility for the integration of a design policy; (3) appoint under him a designer or designers of outstanding ability, giving them full facilities and allow them complete freedom of action; (4) ensure that your public relations, designing and printing of all office stationery, etc., are integrated under the design director; (5) ensure that the highest standards of craftsmanship are maintained; (6) reject second-rate materials; (7) ensure that your design team fully understands your company's production facilities, financial capabilities and markets; (8) imbue the complete staff of the factory with a spirit of adventure and ensure that every member of it has full knowledge of what the directors are undertaking; (9) do not allow your sales department to dictate to the design group. If you have chosen the right designers they will produce the right ideas; to allow the sales department to modify this policy even as a temporary expediency will sabotage your efforts, and (10) re-educate yourselves and your staff to a new way of thinking. Remember that art and industry are allied and that what you produce is a living piece of sculpture.

Obviously, the success detailed by Mr. Julius was due to either his perspicacity in the choice of designer or from luck. There are as many charlatans amongst designers as in any other branch of human activity. The cardinal point of design is the integration of function, beauty and production. It is the second attribute which constitutes the main work of this type of consultant. However, there is the old adage "give the public what they want," and we have yet to learn that the man-in-the-street appreciates artistic values. Offer him a selection of labelled pictures and he would chose those bearing such titles as "Lover's Quarrel" or "Kittens at Play"—or some other sentimental rubbish. Yet this individual can and does understand functional attributes and if these be plainly set out, he will be influenced. It is better to emphasize the ease of cleaning of a vitreous-enamel finish, rather than its undoubted artistic merit. This dictum applies to probably 90 per cent. of the output of the light iron-castings industry.

E

Correspondence

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

From the COUNCIL OF IRONFOUNDRY ASSOCIATIONS

IRON AND STEEL BILL

To the Editor of the FOUNDRY TRADE JOURNAL

Sir,—The Government's proposals for the iron and steel industry have been receiving the most careful consideration of this Council and its constituent associations. Now that the Iron and Steel Bill has been published, the Council feels that its policy should be fully explained to all ironfounders in the country, members and non-members alike.

The present Government's proposals were foreshadowed in the debate on iron and steel in the House of Commons on September 19, 1950, when Mr. Churchill said:—

"We shall . . . repeal the existing Iron and Steel Act. . . . We shall then proceed to revive the solution which has been set forth in the T.U.C. Report . . . *and we shall set up again the tripartite Board, which has been proved to have worked so well.*"

(This Board was the one under the chairmanship of Sir Archibald Forbes which supervised the ironfounding industry from 1946 to 1948 under the statutory powers of the Ministry of Supply.)

In the debate on the King's Speech (November 12, 1951) Mr. Duncan Sandys said:—

"The creation of such a Board, representative of Government, management, labour and consumers, will, of course, be an essential feature of the proposals which we shall, in due course, submit to the House. *Such a board, unlike the Corporation, could embrace the whole industry, which would be an additional advantage.*"

In the debate on the White Paper on October 23, 1952, Mr. Sandys said:—

"It is mainly because the founders use the same materials as steel producers that the foundries must be regarded as an inseparable part of the iron and steel industry. . . *If they were left outside the scheme, the Board would have no direct responsibility for looking after their supplies of raw materials.*"

There is thus clear evidence that ample notice of the Conservative Party's intentions in respect of our industry was given to the public (and therefore implicitly to every ironfounder) from at least two years ago and that its policy has been consistently maintained now that it is in office.

The president of the Joint Iron Council, in his address to the 1948 Convention (a copy of which was sent to all ironfounding members), spoke at length on this question, and said:—

"I know that your executive will welcome a free and unfettered expression of views as to whether we should support the reconstitution of a similar sort of Board as a positive alternative to the Government's policy of State ownership."

When the Minister of Supply consulted the Joint Iron Council in November, 1951, it was therefore no new problem which the executive of that body had to face. The policy then adopted on behalf of both the Council of Ironfoundry Associations (representing the ironfounders) and the Council of Iron Producers (representing the producers of pig-iron and of refined iron) was:—

(1) To support the Conservative Government in its attempt to free the whole iron and steel industry (including 23 per cent. of iron castings production and virtually the whole of the foundry pig-iron production) from State ownership.

(2) To support the Government in its efforts to produce a solution which would remove the whole industry permanently from the field of party politics and which would gain the support of public opinion generally.

(3) To safeguard the raw-material requirements of ironfounders and so far as possible ensure that their interests would not be subordinate to those of the steel industry.

(4) Within the framework of the Government's proposals, to ensure that the freedom and initiative of the industry were properly safeguarded.

(5) To preserve the essential unity of the industry in the partnership between the ironfounders and iron producers which was proving so beneficial to the ironfounders in their struggle for raw materials at that time, and in meeting the common problems which would inevitably arise under the new *régime*.

As to the Joint Iron Council's functions and responsibility to the ironfounding industry and in the light of misconceptions which appear to exist in certain quarters, it is important to recall that it was set up in 1945 with equal representation from both the Council of Ironfoundry Associations and the Council of Iron Producers to speak for both sections of the industry in matters of national importance of common interest to both sides.

In case it should be thought that the views of the ironfounding representatives were in any way dictated by the iron producers when the Minister consulted the Joint Iron Council in November and December, 1951, it should be noted that:—

(1) The voting of the Joint Iron Council executive as a whole was almost unanimous.

(2) The voting of the ironfounding members by themselves was a substantial majority in favour of the policy.

(3) In matters specifically affecting iron castings, the policy was formulated by the ironfounding members and not by the iron producers.

(4) The recommendations of the Joint Iron Council were immediately reported to the Council of Ironfoundry Associations and again almost unanimously supported.

It was not possible at that stage to take the general body of the ironfounders within the bounds of confidence necessarily imposed by the nature of the discussion between the Minister and the industry's representatives.

It was not envisaged that so long a period of time would elapse before the Government published its proposals. In fact, many of the points which were featured in these discussions could not be adequately submitted for consideration by those not present at the discussions without a fuller knowledge of the Government's proposals than had been disclosed at the time. Certain broad considerations did, however, emerge, and these were communicated to members of C.F.A. Council:—

(1) The Government's intention to include iron castings among the activities to be "supervised."

(2) The Government's wish to meet so far as possible the industry's wish for adequate representation on the Board.

(3) The Government's expectation that the Board would not be likely in view of past experience to attempt to bring iron castings generally under price control.

(4) The Government's expectation that only very few, if any, ironfounding development schemes would qualify for review by the Board.

(5) That the powers of the Board would stop at the iron casting and not extend into the field of engineering.

(Continued on page 634)

Recent Experience with Basic- and Acid-electric Steel*

By L. W. Sanders, A.I.M.

This Paper describes the changeover from a small basic-lined electric furnace for steel melting, run in conjunction with a Tropenas converter plant, to balanced production from modern, basic- and acid-lined electric furnaces at the works of Lake & Elliot, Limited. Particulars of the new plant are quoted, together with details of the linings, the melting processes and degree of uniformity and reproducibility obtained

In a Paper[1] read before the annual conference of the Institute in 1942, it was shown how liquid steel of uniform quality could be prepared at regular intervals by two distinct melting processes. The plant then available consisted of two 650-kva. Electro-Metals furnaces, hand-charged and hand-controlled, working with a basic lining, and a 1-ton (nominal) Tropenas converter, the whole melting plant producing 185 tons of liquid steel in 1,584 man/hours (8.55 man/hours per ton). Since 1942, the melting plant has been completely replaced by modern equipment in the following order:—

(1) Automatic control of the electrode regulators replaced manual control.

(2) The increasing works' demand necessitated a change from the company's own steam-driven generating station to the " grid " supply.

(3) In order to obtain maximum efficiency from the high-tension supply and to keep standing charges to a minimum, auto-synchronous condensers to control the power factor, and maximum-demand regulators to control the maximum demand were installed. This interesting plant has been fully described elsewhere.[2]

(4) The 1½-ton, 650-kva. electric furnaces were replaced by a 3-ton, 1,000-kva. furnace, basic-lined.

(5) The cupola/converter plant was replaced by a 1½-ton, 1,000-kva. furnace, acid-lined. (Fig. 1.)

The 3-ton basic furnace presents no new metallurgical features, but results in reduced labour, time and power consumption. The operation of the 1½-ton acid furnace represents a new metallurgical process for the author, and it is thought that a short description of the reasons for its installation and experiences gained in the operation of the two processes may be of general interest. Consideration of the need to replace the cupola/converter process was based upon:—

(*a*) The scarcity and difficulty of obtaining suitable raw materials; (*b*) the availability of low-sulphur and -phosphorus material for remelting from the basic furnace, and (*c*) the need to economize in labour.

Post-war Conditions

The post-war position regarding raw materials of suitable quality had become increasingly difficult, the supply of hematite pig-iron being unreliable and unpredictable, in spite of never-ending concessions in quality to the manufacturers (these latter being granted regardless of the founders' obligation to produce still-higher-quality products to meet more rigid steel castings specifications). Experience over years of the cupola/converter process was based on

* Paper presented to the Buxton Conference of the Institute of British Foundrymen, with Dr. C. J. Dadswell in the chair.

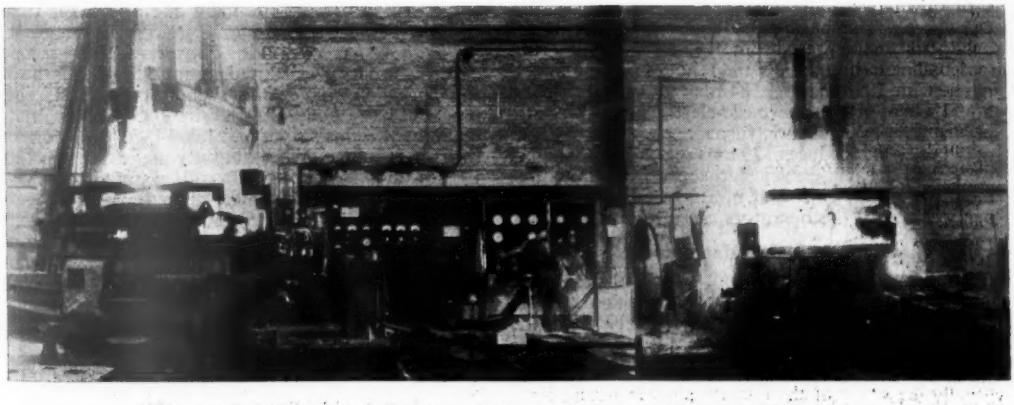

FIG. 1.—*Two Electric-arc Furnaces, Basic on the Left, Acid on the Right.*

TABLE I.—*Steel Production Timetable; Heats Available at the Times Quoted.*

Basic (3-ton furnace).	Acid (1½-ton furnace).
12.30 a.m.	—
3.30 a.m.	—
6.30 a.m.	—
—	7.30 a.m.
—	9.00 a.m.
9.30 a.m.	—
—	10.30 a.m.
—	12.00 a.m.
12.30 p.m.	—
—	1.30 p.m.
—	3.00 p.m.
3.30 p.m.	—
—	4.30 p.m.
—	6.00 p.m.
6.30 p.m.	—
9.30 p.m.	—

a steady supply of West Coast hematite, which was no longer forthcoming, and in consequence all-steel-scrap charges to the cupola had to be utilized over long periods. This position could not continue indefinitely, as the basic electric furnace, despite its operation of 24 hrs. per day, was not producing sufficient low-sulphur and -phosphorus remelt.

The cupola/converter process, whilst undoubtedly useful for producing liquid steel quickly at regular intervals, is also extremely wasteful of manpower on the small units with which the Author is familiar, nine men being employed to produce approximately 60 tons of liquid steel in 540 man/hours (9 man/hours per ton) half these hours being taken up in preparation for production. These considerations are important at any time, but particularly so when labour is at a premium and replacement of personnel is difficult.

Electric Melting Installed

For the reasons stated, it was decided that an acid-electric furnace capable of producing (from "current on," to "current on") a heat of steel every two hours would overcome the raw material shortage and be economic in operation and manpower, in spite of the difficulties alleged to be associated with acid-electric practice. Although the executive were without knowledge or experience of the new process, the cupola/converter plant was shut down overnight, releasing six men for duties elsewhere. The basic- and acid-electric plants are producing at the present time 185 tons of liquid steel in 1,080 man/hours (5.85 man/hours per ton), compared with 185 tons in 1,584 man/hours (8.55 man/hours per ton) on the basic-electric/acid-converter plant. The basic-electric furnace, operated by three men per shift, produces 125 tons of steel in a five-day week, and the acid-electric furnace, operated by three men, works one shift and produces 60 tons of steel per week. All the operators are interchangeable.

Metal and Materials

Foundry mould production, which is predominantly by machine, had hitherto been geared to take 12 tons of Tropenas converter steel between the hours of 12.30 p.m. and 5.15 p.m., and had to be replanned to take steel from the acid-electric furnace every two hours throughout the working day (7.30 a.m. to 5.15 p.m.). The timetable shown in Table I is rigidly adhered to, so that machine layouts can be cleared of moulds at the appropriate times.

Local conditions regarding the acquisition of suitable good-quality scrap for acid-electric melting are not satisfactory, creating the necessity for melting the maximum tonnage in the basic furnace, which ensures a steady supply of low-sulphur and -phosphorus remelt for the acid furnace. On the basis of a 2:1 ratio of basic to acid return material for remelting, the necessity of a close control of material for remelting is not essential to enable steel to be produced having a sulphur and phosphorus content very little higher than basic-electric steel.

Mechanical and Electrical Considerations

Three-ton Efco-Héroult Furnace.—This furnace was installed in 1947, having a body 7-ft. 4-in. dia. The furnace is of the swing-roof, top-charging type, designed to give the quickest possible turn-round to re-commence melting after pouring the previous heat. The tilting equipment consists of a hydraulic double-acting cylinder and ram, directly connected through the furnace body. The roof is suspended from two side arms projected from the electrode-mast supporting structure. This structure is directly bolted on to an extension of the hydraulic roof-raising ram.

Electrical equipment consists of a 1,000-kva. transformer with six tappings giving output voltages of 155, 135, 120, 88.9, 73 and 69.5. The change from one voltage to another is accomplished by the furnace operator by a selector switch on the main furnace control panel, which in turn operates an off-load tap-change switch forming part of the transformer equipment. The main high-voltage circuit-breaker has a rupturing capacity of 150 mva. The furnace regulator is of the clapper type. The essential features of the automatic electrode control are balanced power relays with metal rectifiers which control the voltage and current coils on the balanced power relays, with a set of contacts which also control the electrode contactor for the raising and lowering electric motors. There is also a high-speed contactor to take care of any overload. This enables the electrode motors to raise the electrodes at full speed to prevent the main circuit-breaker from tripping-out.

1½-ton Efco Héroult Furnace.—This second electric furnace was started up in 1951. Like the 3-ton furnace, it is of the swing-roof, top-charging type, but has a body of 6-ft. 6-in. dia. The electrical equipment consists of a 1,000-kva. transformer with six tappings giving output voltages of 140, 120, 103, 88.8, 69.5 and 59.5. It will be noted that these voltages are generally lower than those for the 3-ton furnace, in order to avoid undue refractory wear in the smaller furnace. The lowest voltage of 59.5 is not of much practical use, but it is the star voltage corresponding to the 103-volt tapping obtained when the primary windings are connected in delta. The circuit-breaker is similar to that on the 3-ton furnace.

The regulator, however, is of the latest rotary type, the principles of which are simple: each electrode motor is fed with direct current from a generator,

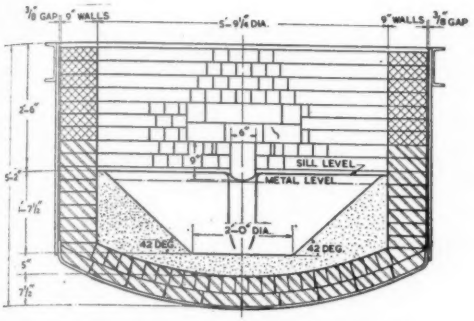

FIG. 2.—*Basic Electric-furnace Refractory Construction.*

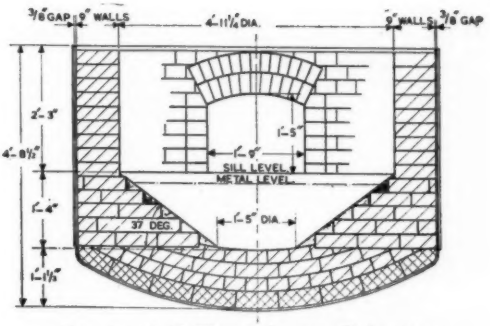

FIG. 3.—*Acid Electric-furnace Refractory Construction.*

the three generators being driven by a common motor. The direction and amplitude of the current is determined by the relative strengths of the electrode current and the arc voltage. The direction of rotation of the electrode motor, and its speed, are in turn determined by the relative strengths of the arc current and voltage. The electrodes are moved up or down accordingly, the speed of movement being in proportion to the variation from normal. Thus quick response is obtained without "hunting," with the result that peaks are reduced in duration and more effective power (and, consequently, output) is obtained in a given time.

Anyone familiar with electric-power supply tariffs will be aware of the financial advantage to be gained by keeping down the maximum kva. demand. This limitation must, of course, be compatible with the total power requirements and these, so far as steel-melting furnaces are concerned, are chiefly governed by the steel production. The power input of an arc-furnace during the melting period is very high, much less during the refining period, and, of course, absent during fettling, charging, etc. This problem was solved by the equipment previously described.[2]

Furnace Construction

Basic.—The bottom of the basic furnace is made up of two courses of magnesite brick, tarred dolomite forming the working hearth, the side-walls being of basic "341" brick, and with a silica-brick roof. The life of the side walls is 120 heats and the roof 40 heats. Whilst the life of the roof may be considered low, it should be emphasized that the roof is changed weekly to avoid failure and subsequent lost-time for changing during the week. (See Fig. 2.)

Acid.—The furnace bottom in this case consists of one course of fire-bricks arranged on end, plus three flat courses of silica brick with a 1 in. layer of rammed ganister above. The side walls and roof are constructed of silica brick, the life of the side walls being 250 heats, and the roof, 350 heats (Fig. 3).

Furnace Charges

Basic.—The basic charge is made up of 3 tons of mixed steel scrap of variable size, and consisting of approximately 75 per cent. bought scrap and 25 per cent. general turnings. The heavy scrap is loaded first into the drop-bottom bucket followed by the lighter type of scrap, crushed turnings being on top, these falling directly under the electrodes.

Acid.—Charges to the acid furnace are made up entirely of foundry return scrap—heads, gates, etc. —in the proportion of 75 per cent. basic scrap and 25 per cent. acid. To facilitate striking the arc, a few shovelfuls of turnings of variable quality are thrown directly under the electrodes, this is a necessary precaution to avoid electrode breakage. The heads from the basic-electric process castings are variable in size and weight, the largest being in the region of 2½ cwt. Whilst it is realized that scrap of this size is difficult to melt in a small furnace and the risk of electrode breakage is greater, the charge does pack very compactly and enables the operator to maintain sulphur and phosphorus only slightly above that of basic steel.

Basic Melting

Basic melting takes place on full power of 155 v. and 4,200 amps. The scrap is arranged in the drop-bottom bucket so that the heavy scrap falls directly under the electrodes, the arc being concentrated on the heavy scrap so as quickly to form a pool of metal. Lime is added to the charge, about 75 lb. to the ton being used. Melting is conducted as rapidly as possible, the time taken to all-clear-melt 3 tons being 100 min. Further lime is added from time to time to form slag. When the bath is all-clear-melted, the temperature is just high enough to ensure a liquid slag under normal conditions.

Oxidizing.—At the end of the melting period, the bath contains approximately 0.40 to 0.45 per cent. carbon. This is removed by oxygen injection, which is blown at 125 lb. per sq. in. pressure, with a flow rate of 175 cub. ft. per min., using a ¼ in. dia. seamless steel pipe. Lagging of the pipe is not practised on either furnace, the life of the pipe being 18 in. per ton of metal blown. It is the author's opinion that whilst this practice on basic furnaces is undoubtedly a time-saver, and consequently an increased amount of liquid steel is obtained, no evidence exists that steel produced by this method is any cleaner or of better quality than steel which is produced using ore under controlled "boiling" conditions on a rising temperature

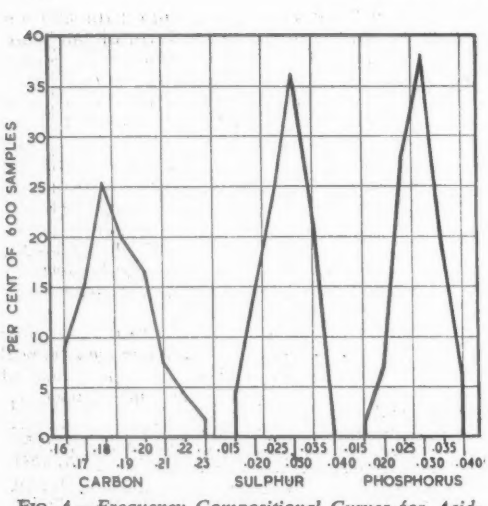

FIG. 4.—*Frequency Compositional Curves for Acid-electric Steel to B.S.* 592:1950, *Grade A.*

gradient. Experience is that if the initial carbon is much lower than 0.35 per cent., the oxygen boil is inclined to be long and sluggish. At the end of the "boil," the bath contans 0.09 per cent. carbon, 0.008 per cent. silicon, 0.10 per cent. manganese and 0.020 per cent. phosphorus.

Refining.—After completely slagging off the bath, the power input is reduced to 100 v. at 4,200 amps., and after about 10 min., when the refining slag begins to melt, a small quantity of ferro-silicon is added to hasten deoxidation. The slag is worked up to strongly reducing conditions by the addition of lime and coal as required. Spoon samples are taken at intervals to observe the general condition and temperature of the steel. When the metal is hot enough and the slag in good condition, the bath is adjusted for carbon by the addition of hematite pig-iron, and the final addition of ferro-silicon and ferro-manganese is made to bring these elements to the desired composition. The additions are allowed to melt and the bath is well rabbled before a sample is poured into a sand mould. The sample should be quiet and exhibit proper piping. Aluminium, 2 lb. per ton, is added to the ladle as a final deoxidizer.

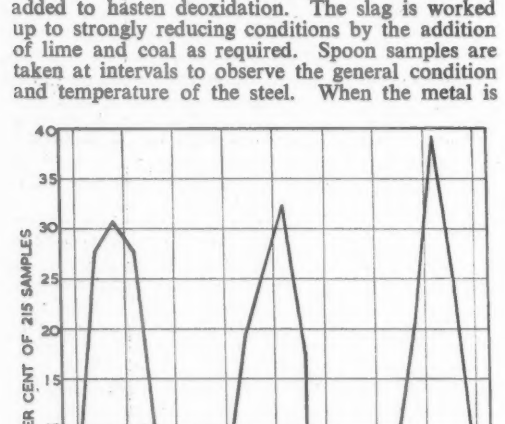

FIG. 5.—*Frequency Compositional Curves for Acid-electric Steel to B.S.* 592:1950, *Grade B.*

Acid Melting

Acid melting is conducted as rapidly as possible on full power input of 140 v. at 4,200 amps., the time taken to the clear-melt condition for 1½ tons being 55 min. A few pounds of silica sand are added as soon as a pool is formed, additional slag cover being provided by oxidation of silicon and manganese contained in the foundry scrap. Some iron also is oxidized, forming FeO, which additionally contributes to the slag. Experience during a run of 1,000 heats has shown the importance of keeping the slag to a minimum in order to avoid increases in the decarburizing time. Care is taken to avoid any interruption during the melting period, and overloading of the furnace is never practised, as it appears that to prolong the melting period beyond a given time will create a bath difficult to

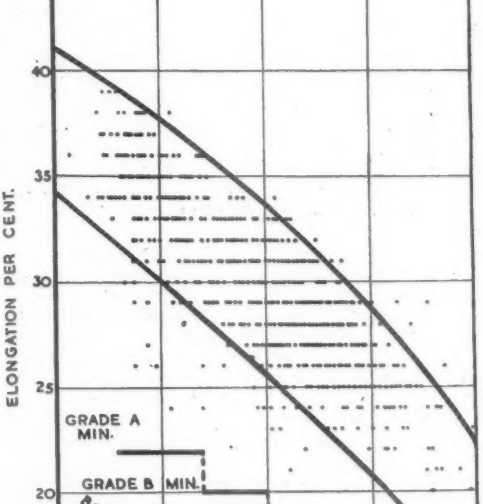

FIG. 6.—*Relationship between Ultimate Tensile Stress and Elongation (Carbon Steel Castings, Normalized) for Steel made by the Basic-electric Process.*

"kill." The slag at the end of the melting period is black in colour, indicating a high oxide content, and the bath composition is:—Carbon, 0.35, silicon, 0.45; and manganese, 0.50 per cent.

Carbon removal.—When sufficient temperature is attained, the carbon is eliminated by oxygen injection, using the same technique as on the basic furnace. Blocking or "catching the carbon" is not practised, and the heat is worked down to 0.09 per cent. carbon. The use of oxygen enables a vigorous "boil" to be attained over a given period without danger of over-oxidation, and also ensures that the "boil" takes place on a rising temperature gradient, a condition of steelmaking which is considered essential for quality steel. At the end of the "boil," the bath contains 0.09 per cent. carbon, 0.15 per cent. silicon, and 0.15 per cent. manganese. During the blow, the temperature of the bath increases by approximately 50 deg. C.

When sufficient carbon has been removed, the bath is re-adjusted by a small addition of ferro-manganese and part of the slag is removed. After the slag has been run off, pig-iron is added, when necessary, to recarburize, thus the final carbon content can be controlled within a very narrow range.

Figs. 4 and 5 show frequency curves for 600 and 215 heats. Slag is added in the form of sand, fire-brick, and a small quantity of limestone chippings.

Finishing.—Finishing the heat is a very important operation if high-quality acid-electric steel is to be made. After the slag has "shaped-up," it is the practice to finish the heat in two distinct stages. Half the ferro-silicon is added after the slag has "shaped," and a spoon sample is taken to observe the temperature and general conditions of the steel. If these are satisfactory, the remaining half of the finishing alloys are added and the bath thoroughly rabbled before pouring a test-peg. By this method, loss of silicon and manganese are held to a minimum.

Aluminium, 3 lb. per ton, is added as a final deoxidizer to the ladle. The complete cycle is well within the specified time limits, a complete heat of steel being worked, tapped, and the furnace re-charged in 90 min.

Various types of steel are made by this process, including plain carbon; carbon-molybdenum; manganese-molybdenum, 2 per cent. Cr./¼ per cent. molybdenum; 5 per cent. Cr./ ½ per cent. molybdenum, and 10 per cent. Cr./ 1½ per cent. molybdenum. When alloy steels are made, all alloy additions are made in the furnace, the non-oxidizable

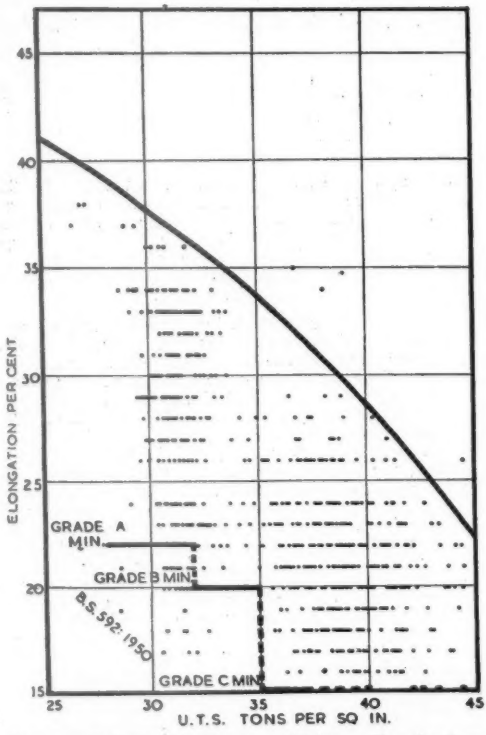

FIG. 7.—*Relationship between Ultimate Tensile Stress and Elongation (Carbon Steel Castings, Normalized) for Steel made by the Acid-Tropenas Converter Process.*

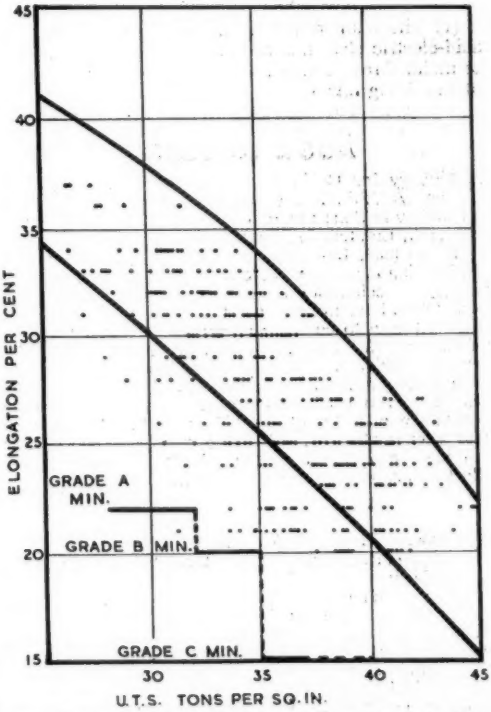

FIG. 8.—*Relationship between Ultimate Tensile Stress and Elongation (Carbon Steel Castings, Normalized) for Steel made by the Acid-electric Process.*

TABLE II.—*Germane Data of the Processes.*

	Basic (3 tons).	Acid (1½ tons).
Power rating (kva.)	1,000	1,000
Operational time, tons per hr. ..	1.12	1.06
Unit consumption per ton cast (kwh.)	676	611
Electrode Consumption per ton cast (lb.)	10.9	8.9
Side-wall lining life (tons)	250	300
Roof life (tons)	125	420

alloys being added immediately after the "boil," and oxidizable alloys, such a chromium, are added after the steel is fully de-oxidized, and before tapping. The economics of the processes are shown in Table II.

Relative Quality

In the past, much has been written regarding the relative quality of steel made by different melting processes. Figs. 6, 7 and 8 show a comparison of 1,000 tests on basic and Tropenas steel, and 350 tests on acid-electric steel (all carbon steels being made to B.S.S. 592:1950, and in the normalized condition). Generally, the ductility of basic steel is more uniform over all grades of the specification, with acid-electric only slightly behind and Tropenas converter extremely inconsistent.

Conclusions

(1) The changeover from Tropenas converter to acid-electric steel has resulted in a more even flow of metal through the shop, and a quicker turn-round of moulding boxes.

(2) The same quantity of steel is produced by reduced manpower in the same overall time.

(3) If the timing and procedure be controlled, there are no metallurgical difficulties in making acid steel for foundry use.

(4) Providing close control of scrap is maintained, it is possible to produce acid-electric steel having physical properties similar or only slightly inferior to basic-electric steel.

(5) No claim is made that oxygen injection promotes cleaner steel by comparison with properly-controlled ore practice, but it does definitely facilitate faster throughput at lower cost.

(6) In the light of later experience, it would appear that a higher kva. rating in the basic unit would make for a more balanced combination.

The Author wishes to thank the directors of Lake & Elliot, Limited, for permission to publish the Paper, Mr. J. C. Howard, Electric Furnace Company, Limited, who provided the mechanical and electrical details, and the British Steel Founders' Association, Research and Development Division, who kindly provided the graphs from data supplied.

REFERENCES

[1] Production of Uniform Steel for a Light Castings Foundry, by C. H. Kain and L. W. Sanders, *I.B.F. Proc.*, vol. 35. p.A.27.
[2] *Electrical Review*, vol. CXLV, August, 1949; *Practical Engineering*, vol. 20, September, 1949.

[* Owing to a hitch in reporting the Buxton Conference, no accurate record is available of discussion contributions which followed presentation of this Paper. To avoid possible errors and omissions, it has therefore been decided not to print any discussion.—EDITOR.]

Book Reviews

Metallurgy for Engineers, by J. Wulff, H. F. Taylor, and A. J. Shaler. Published in New York by John Wiley & Sons Inc., and in London by Chapman & Hall, Limited, 37, Essex Street. Price 54s.

In the past, few textbooks dealing specifically with engineering metallurgy have been completely successful, and vital techniques such as those used in castings production have not received the attention they deserve. It is not easy to combine adequately the many aspects of the metallurgical field which are of interest to the average engineer. In the admirable textbook under review, the authors have avoided the usual pitfalls, and have produced an excellent work which can be recommended not only to engineers, but also to foundry and science students. Valuable references for further reading are provided, and the clarity of both text and illustrations adds to the worth of the book.

J. B. McI.

The Composition and Assaying of Minerals by John Stewart-Remington and Dr. Wilfrid Francis. Published by the Technical Press Limited, Gloucester Road, Kingston Hill, Surrey. Price 17s.

This is the type of book for which an index is essential and as the Authors have failed to include one, there is a cause for adverse comment. Beyond that criticism, the reviewer esteems the book highly. Most chief chemists in foundry and steelworks laboratories from time to time receive a mysterious sample from the chairman's brother-in-law who desires it to be identified and analysed. Recourse to this book will probably provide the answer quite quickly, but not always. The book starts off with the tests for the rapid identification of materials and then runs through many of the elements both metallic and non-metallic, indicating without going into tiresome detail the steps to be taken for analysis. The reviewer commends the book to his readers; at the published price it appears to be good value for money. V.C.F.

Grundlehrgang für Former, by Friedrich Dellwig and Wilhelm Esch; **Was jeder Maschinenformer von seiner Arbeit wissen müss,** by Dr.-Ing. Heinz Gries; and **Was jeder Kernmacher von seiner Arbeit wissen müss!** by Dr.-Ing. Habil. Carl. W. Pfannenschmidt; all published by Giesserei-Verlag G.M.B.H., (22a) Düsseldorf, Breite Strasse 27, Postfach 2590. Prices, D.M., 5.60; 3.20; and 3.60 respectively.

These are part of a series of booklets for learners in the foundry industry, prepared under the aegis of the *Verein Deutscher Giessereifachleute* (the Institute of German Foundrymen). The illustrations are easily the best the reviewer has ever encountered in text books of this type. The books, are, as would be expected from their source, thorough in every aspect—even the proper method of handling a shovel is shown. The titles of these booklets are "Basic Knowledge for the Moulder"; "What every Machine-moulder must know about his job"; and "What every Coremaker must know about his job." Only rarely in the book appears that pedantic type of teaching, that is, illustrations labelled "right" and "wrong," a feature in German foundry literature which used to be all too common. Allowing for the differences in national mentalities, the reviewer deems these booklets to be excellent for the purpose for which they were prepared. The booklets are all in German.

Ultrasonics in the Foundry*

The introduction of the Mullard ultrasonic soldering equipment provided, for the first time, an effective and efficient method for soldering aluminium and other light metals without the use of flux. This equipment is to-day finding an increasing number of important commercial applications, and is helping to expand the scope and economic use of aluminium and its alloys in many branches of industry. One particularly interesting field of application is in the foundry. Here the ultrasonic soldering iron is proving of great value for the surface treatment of faulty light-alloy castings and for the modification and repair of aluminium patterns.

Surface Treatment of Faulty Castings

The main causes for the rejection of light-alloy castings in foundries are blowholes, dross inclusions and cracks. If these defects are severe, the faulty castings are returned to the melt, and the cause of the trouble is diagnosed and rectified. In practice, however, in spite of the care that is taken, a number of light-alloy castings are rejected on account of surface blemishes, which, although not materially affecting the strength of the castings, nevertheless mar their appearance. The reclamation of such castings has for long been a pressing problem in the foundry.

In the past, the problem of blowholes and similar defects has to some extent been overcome by filling in the surface defects with metallized glues or molten aluminium. The results, however, have never been entirely satisfactory, and the repaired areas could often be detected, even after painting. With the aid of the new ultrasonic soldering iron, surface blowholes and cracks can now be quickly and permanently filled, and an excellent finish obtained.

Details of Method

The casting is first preheated to the melting point of the solder used. The cavity is then filled with molten solder and the bit of the soldering iron is applied. The erosive action of the vibrating bit removes the oxide film on the sides and bottom of the hole, and rapid and effective tinning occurs. The bit is then withdrawn. If necessary, further solder can be added and allowed to solidify, after which the surface can be machined to the shape of the casting.

Although the ultrasonic soldering process is quite effective for the rectification of surface defects in castings, it cannot be considered suitable for jointing castings where the design is such that appreciable stresses occur across the repaired break. The reason for this is that, although the zinc-base solder has a shear strength of three tons per sq. in., it is normally not as strong as the base metal. If, however, the part of the casting to be treated is used only for ornamentation, lap and butt joints can be used; these will withstand all normal usage.

Modification and Repair of Patterns

Another promising application of the ultrasonic soldering technique is in the modification and repair of aluminium patterns; up to now alterations to light-metal patterns have presented serious difficulties. Some success has been obtained with the riveting and red-lead method, but this tends to be costly and wasteful. Using the ultrasonic soldering iron, however, an initial tinning of the area to be modified or repaired can be effected on which solder can be built up and formed to shape. The saving in time over the fabrication of a new piece/part is thus considerable and the resultant job will withstand all normal stresses.

Soft soldering can also, in many cases, be utilized in the manufacture of the initial light-metal pattern. This can lead to a saving in machine-shop capacity, for instead of drilling and tapping the various parts to be joined together, they can now be effectively soldered.

Technical Features

The ultrasonic soldering equipment for use in the foundry consists of two units: a soldering iron and a power unit. The soldering iron is supplied with a flat chisel bit for the treatment of large surfaces and a tapering bit for the treatment of cavities. The bit is heated by means of a low-voltage resistance-winding of conventional type, the necessary power being supplied from a transformer contained in the power unit. The bit is secured to a magneto-striction transducer, which converts the electrical energy from the power unit into mechanical vibratory energy, thus causing the tip of the bit to vibrate at a high frequency. The amplitude of vibration is very small, being in the region of fractions of a thousandth of an inch. A trigger switch in the handle of the iron controls the supply of ultrasonic power to the bit. The heater element is controlled from the mains switch on the power unit.

FIG. 1.—*Rectifying Surface-sand Faults on an Aluminium-alloy Water-cooling Element.*

* Commercial information can be obtained from the Equipment Division, Mullard, Limited, Century House, Shaftesbury Avenue, London, W.C.2.

Heat Transfer

A conference for a general discussion on heat transfer arranged jointly by the Institution of Mechanical Engineers (London) and the American Society of Mechanical Engineers in co-operation with other societies in Britain, the British Commonwealth, and Europe, was held at the Institution in September, 1951, and was continued at Atlantic City, New Jersey, U.S.A., in November, 1951. The proceedings have now been published, and copies are available at £2 5s. from the secretary, Institution of Mechanical Engineers, Storey's Gate, London, S.W.1.

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Personal

MR. H. G. CARTER, A.C.A., secretary of Lancashire Dynamo Holdings, Limited, has now been appointed to the board.

MR. JOHN G. STEPHEN, director of Alex. Stephen & Sons, Limited, Glasgow, has been elected president of the Shipbuilding Employers' Federation.

MR. E. FITZWALTER WRIGHT, chairman and managing director of the Butterley Company, Limited, has been re-elected chairman of Ripley Magistrates.

MR. T. BROWN, managing director of the Sheepbridge Engineering, Limited, Chesterfield, left by air yesterday on a ten-day visit to the United States and Canada.

MR. A. BRIZON, a past-president of the *Association Technique de Fonderie Française*, has been nominated as vice-president of the International Committee of Foundry Technical Associations.

MR. D. LION-CACHET, a past-president of the South African Branch of the Institute of British Foundrymen, has been elected president of the Steel and Engineering Industries Federation of South Africa.

MR. ALBERT ELSON, safety officer of Samuel Fox & Company, Limited (branch of the United Steel Companies, Limited), Sheffield, takes the part of a works' safety officer in the British Iron and Steel Federation's film, "At Whose Door?"

MR. HARRY PARKINSON, of Baildon, a director of J. Parkinson & Son (Shipley), Limited, machine-tool makers, Canal Ironworks, Shipley, has been elected president of the Bradford and District Association of the Engineering and Allied Employers' National Federation.

SIR JOHN DALTON is to join the board of W. T. Henley's Telegraph Company, Limited, London, E.C.1, and it is understood that he will succeed SIR MONTAGUE HUGHMAN, who is to retire, as chairman of the company and its subsidiaries. The Cable Makers' Association, of which Sir John is a director, has agreed to release him as soon as his present commitments permit.

MR. GEORGE H. ALLEN has retired from the position of manager of the Southampton branch of Harland & Wolff, Limited, the Belfast shipbuilders. Before joining Harland & Wolff at Liverpool in 1914 he was employed in the drawing office of Smith's Dock Company, Limited, North Shields. Appointed to Southampton in 1917 as senior engineer manager, he became manager in 1942 after 10 years as deputy manager.

MR. ARTHUR F. OATLEY, managing director of Cannon Iron Foundries, Limited, Deepfields, Bilston, left London last Sunday for New York and Chicago. The kitchen gas stove of a new type, in which he hopes to interest Americans, was declared too heavy to travel with him by passenger aircraft, so it was sent by freight plane from Elmdon on November 20, and is expected to reach Chicago about six hours after Mr. Oatley.

MR. W. A. COATES has been appointed general sales manager of Metropolitan-Vickers Electrical Company, Limited. Mr. Coates, who succeeds the late Mr. Duncan MacArthur, retains his seat on the board. A well-known authority on switchgear, Mr. Coates joined Metropolitan-Vickers (then the British Westinghouse Company) in 1909 and, except for a period as chief engineer of the Ferranti Electrical Company of Canada, has been with the company ever since.

Obituary

THE DEATH is announced of MR. W. BRANDT, foundry manager, Trianco, Limited, Surrey.

MR. JOSEPH WIGGIN, who has died at the age of 73, was a director of J. & J. Wiggin, Limited, bathroom fitting manufacturers, of Bloxwich (Staffs).

MR. JOHN RALSTON, who died in Birmingham recently at the age of 59, was the Midland representative of Colvilles, Limited, the Glasgow iron and steel manufacturers.

MR. E. O. LIEBERT, former chairman and joint managing director of John Holroyd & Company, Limited, founders and machine-tool manufacturers, etc., of Rochdale (Lancs), has died at the age of 85.

THE DEATH occurred on November 17 of MR. WILLIAM EWART DENNIS, senior partner in the firm of Millar, Dennis & Company, brassfounders and engineers, 140, Thornton Road, Bradford, a firm established in 1870.

MR. MALCOLM CLARK, vice-chairman of Richardsons, Westgarth & Company, Limited, marine engineers, etc., of Hartlepool, died recently. He was also vice-chairman of Geo. Clark (1938), Limited, marine engine and boiler makers, of Sunderland, and of the North-Eastern Marine Engineering Company (1938), Limited, Wallsend-on-Tyne.

MR. SYDNEY BRYAN DONKIN, the senior partner in Kennedy & Donkin, consulting engineers, of London, S.W.1, died recently at the age of 81. One of the three engineers appointed in 1943 to re-examine the question of a Severn Barrage, he was chairman of the Association of Consulting Engineers in 1927-28 and in 1943-44, and president of the Association of Supervisory Electrical Engineers in 1928-31, and of the Institution of Civil Engineers in 1937-38.

THE DEATH occurred suddenly on Thursday last of MR. MATTHEW E. SWAIN, chairman of Matthew Swain, Limited, ironfounders, Newton Heath, Manchester, 10. Mr. Swain, who was in his 67th year, had completed 50-yrs.' service with the firm. He received his education at Manchester Grammar School and after entering the service of the firm was appointed a director in 1912. He joined the Lancashire Fusiliers in the early days of the 1914 war and was given a commission. He was invalided out of the army, and resuming his business career, took control of the Company on the death of his brother, Mr. J. J. Swain.

London Branch Dinner

Mr. D. Graham Bisset presided at the annual dinner/dance of the London branch of the Institute of British Foundrymen, which was held last Friday at the Café Royal, London, W.1. The attendance of nearly 300 members, their ladies, and guests, was a record for the branch. After an excellent dinner, only short speeches were delivered, first by the branch-president, who proposed "The Guests." The president of the Institute, Dr. C. J. Dadswell responded, and Mr. Noël Newman, a past-president of the Institute, then proposed the health of the ladies, to which Mrs. Dadswell replied. The company was entertained later in the evening by Henderson and Henshaw, who gave a brilliant and also amusing display of ballroom dancing. Mr. Alec Wizard ably fulfilled the rôle of master of ceremonies. The arrangements for the evening were in the hands of Mr. A. R. Parkes, assisted by Miss J. V. Lowdon.

The Buyer's Point of View

A recent meeting of the London branch of the Institute of British Foundrymen, presided over by Mr. L. G. Beresford, was devoted to a talk and discussion on the buyer's point of view as related to the purchase and sale of castings.

The subject was introduced by MR. J. F. KAYSER, a past president, who initially pointed out that his remarks would be coloured by his association with Gillette Industries. This firm, as makers of razor blades, undertook mass-production on a vast scale.

His first premise was that successful and economical manufacture, whether it were mass production or jobbing work, depended upon efficient buying. Unfortunately many buyers appeared to have no point of view at all, or if they had it was the " price complex " view *i.e.*, in their eyes the only thing that counted was price per ton, per gross or per gallon, etc.

A more fallacious point of view it was impossible to imagine, although one did frequently read in the Press that a prominent manufacturer had stressed that the whole of his business depended upon cheap steel or cheap castings as the case might be, and from contact with such people he knew that in the vast majority of cases they were always thinking of £ s. d. per ton. Successful manufacture depended upon a steady flow of suitable raw materials and it should be remembered that one firm's finished product was the raw material of a second, whilst on the question of cost it should be emphasized that the matter which counted most was the final cost of the further fabricated article, and that raw materials costs plus fabrication costs must be a minimum.

Specifications

Where possible one should always buy to specification. It was, of course, futile to insist that a certain part should be made from a copper bearing alloy made to a certain specification, when the use of copper for that particular purpose was prohibited by law. That, however did not call for the purchase of material not to specification, but for a substitute material of defined properties.

Many manufacturers still refused to divulge the composition of metals supplied by them. This particularly applied to high-speed steels, stainless-steel castings and alloys, and nickel-silver alloys (17 Ni. 17 Zn. balance copper). The main characteristic of metals of undisclosed composition was that they were twice as expensive as when details were given.

Other subjects touched upon by Mr. Kayser were patented articles or processes; secret mixtures; inspection and technical representatives.

Purchasing Officer's Viewpoints

MR. HUEBNER, chairman of the London branch of the Purchasing Officers' Association, denied that commercial buyers in this country generally purchased on price only. The days were gone when a buyer enquired what was the price and immediately requested a reduction. The majority of buyers to-day investigated the quality, delivery, price, and any other factors which entered into the particular negotiation.

Mr. Kayser had referred to a type of castings, apparently excelling in exactitude, and Mr. Huebner said he would be interested to know the name of the foundry which could produce these—or possibly the foundryman was present at the meeting. In his own experience he had found that even the first-class foundries ran into unexpected troubles from time to time. Although these troubles were not his concern, the buyer must be prepared to concede some points to the foundry, and it seemed impossible to expect the " spot-on " accuracy indicated by Mr. Kayser.

Mr. Huebner was in entire agreement with Mr. Kayser that, wherever possible, purchases should be made on specification and most firms were gradually turning over to this method. It should be remembered, however, that in industry there were vast numbers of small firms who could not contemplate buying on specification and must rely on the foundryman giving them a good article at an economic price.

On the subject of inspection, Mr. Huebner agreed that it was necessary, but doubted whether it would be possible to reach that acme of perfection set out by Mr. Kayser; unless the foundry were to be allowed a greater percentage of error than was indicated, he felt that there would be constant bickering. The designer often caused trouble by producing drawings without knowing whether it was commercially practicable to make a casting of a particular design. It was here that the buyer had to act as a " go-between " between the foundryman and the designer, to indicate tactfully to the former that he was unwise in his design, and, at the same time, persuade the foundryman that he should be able to produce what was desired.

A point had been raised about technical representatives, but during Mr. Huebner's commercial experience, he had not come across a great number in the foundry trade. In general, the foundry trade appeared to employ salesmen, who, if tackled with a technical problem, very rightly indicated their lack of knowledge on the particular point and then brought along a member of the technical staff—and in many instances the actual foundry manager himself.

Rules for Buying

MR. MITCHELL, the treasurer of the Purchasing Officers' Association, said the buyer's job might be placed under five ideals. His function was to obtain for the efficient operation of his firm:—The right quality; at the right time; in the right volume; from the right source; and at the right price.

The right quality.—The user, the engineer or production manager who had to bear the responsibility for the performance of the specified article characteristically viewed quality from the

The Buyer's Point of View

performance angle only. The buyer regarded quality as a factor to be considered with others, such as price and delivery. These two points of view had to be reconciled if maximum co-operation between the two departments were to be attained. The buyer knew what the users could not know—the amount of money the company must pay for the goods. He had the right and opportunity, by virtue of the nature of his position to suggest alternatives, revisions to specifications, etc., which would reduce cost without detracting the quality. Engineers and production staff were rarely unresponsive to ideas which would reduce manufacturing costs.

At the right time.—The most important point to be considered about time was that the goods should be available when they were needed. There were many occasions when purchases must be made at the time, or immediately after, the need was expressed. The buyer, whose aim was to buy on the terms most favourable to his company, depended on the using departments to provide him with reliable details of quantity, quality, delivery required, and so on. He had to consider the right time to buy, and obviously if he had plenty of latitude in matter of time, he was better able to study market trends, forward buying, transport rates, price movements and so on. If the purchasing department was asked to procure the goods at the last minute and they were consequently needed in a hurry, all other considerations must be subordinated to that of time. This so often meant that it must take what was available for immediate delivery—not what was desirable for the purpose. Quality often became a secondary consideration, and sub-standard or extra-standard material must be accepted neither of which represented an economical purchase.

In the right volume.—The modern tendency, where conditions were favourable, of low stock levels and regular deliveries in small quantities was attractive from the point of view of consumer economy, and was consistent with good practice, provided no price premium was paid which would offset the carrying charges of a larger investment. This system would operate with maximum efficiency at a time when supply generally exceeded demand, but in times of material shortage, it carried with it a risk which must be carefully calculated in the light of all the prevailing conditions

From the right source.—It was essential that the buyer should build up dependable sources of supply. Emergencies were frequent in his daily job. He was called upon regularly to increase or decrease the flow of supplies, to cancel one order, modify another, and there was always the threat of a breakdown in production due to shortage of material or plant from one cause or another. Fair dealing on both sides was the sure basis. If he was to prevail successfully on suppliers to extend abnormal service at the time it was needed, the buyer must have acquired a reputation with them for reasonable dealing in normal times. Loyalty to proved suppliers was a mark of good purchasing practice.

The right price.—Price was without question a consideration of major importance in any purchase transaction but to the uninitiated in purchasing practice it was a highly over-rated factor. Basically, price was rarely, if ever, considered alone for its own sake, but with other factors as a means to certain objectives of economical and efficient company operation. Price was generally the last factor to be considered, for price was meaningless unless it was affirmed on adequate quality, assured delivery, reliability and continuity of supply and satisfactory commercial relations. Price was just one of the terms and considerations of a purchase order, no more nor less important than any of the other details set forth.

The right price might be defined as one which represented a fair and reasonable profit on goods produced and distributed on economical lines. It was the duty of the buyer to see that he was not charged an excessive profit or made to pay for inefficient and consequently uneconomical methods of producing the goods he purchased. It was a regrettable fact that some buyers would purchase on price alone, selecting the lowest figure—on the other hand some would insist on quality first, cheerfully paying the highest price in order to secure trouble-free service. In fact, quality and price should be regarded as of equal importance.

DISCUSSION

Over-ordering in Times of Scarcity

MR A. R. PARKES said he would throw down the challenge to the buyers by saying that they were dangerous persons. In times of shortage they were in the habit of over-requisitioning commodities in short supply, thereby completely upsetting the market, because, when the shortage suddenly ceased, as so often happened, they only wanted part of their full order. That sort of thing much confused their suppliers of castings. Could the Purchasing Officers' Association say what steps they took among their members to prevent that sort of thing taking place?

MR. HUEBNER replied that, as an Association, they had no control over their members in such matters, but he felt that the troubles to which Mr. Parkes alluded were as much created by the supplier as by the buyer. If the supplier did his best to meet demands within the times called for, the panic deliveries would not occur.

MR. MITCHELL asked to be allowed to put a word in on behalf of the buyers. He thought it was not generally realized how much control was exercised on the buyer by his company. It had been remarked that they created shortages and surpluses. As a matter of fact they did nothing of the sort; they were merely the victims of those circumstances. They ordered goods on requisitions which were produced from the laid-down plans of their factories, and as such they placed the orders and tried to get the goods in to the required time. Then, owing to circumstances beyond control, the firm announced that they could not produce to the planned programme and immediately turned to the buyer to stop the material coming in because they were getting over-

stocked. Then the buyer had to cancel orders. Often that was brought about through the difficulty of the supplier in giving delivery at the time which it was promised.

Delivery Dates

MR. J. BRIGG asked, on the subject of delivery, why it was that people had a tendency to give, say, a delivery date of six months, and after nine months the purchaser began to inquire where the article was. To-day, one had to add between 50 and 100 per cent. on to a delivery date. What was the purchasing man doing in that situation? He also asked what were Mr. Kayser's views on ordering under a trade name rather than a specification.

MR. HUEBNER thought the buyer could not unduly influence the supplier on the subject of delivery. He felt that one of the troubles was that to-day firms had the impression that unless they had a very large order-book they would be short of work. It seemed they had forgotten that before the war, if they had six weeks' work on their order-book, they were quite well placed. From the manufacturer's point of view, purchasers must cease the desire to see large quantities of supplies pouring in and, from the supplier's point of view, holding orders for months ahead. Firms which merely ordered their goods as "a malleable casting" or just as "cast iron" were the legitimate prey of the salesmen.

Trade Names and Specifications

MR. KAYSER said he did not know what he would do with anyone who would not buy to a trade name or to a specification. He would certainly always buy a motor car or shaving soap and the like, to a trade name every time, because one knew that the makers were reliable.

During the war his firm were buying castings which went into a self-chucking machine. The contacts would only allow for a variation of about $\frac{1}{4}$ in. and the firm could not continue with them and had to buy drop-forgings because the processing should have run at about 800 or 900 a day and if the casting would not go into the chuck when it opened, it stopped everything.

They had another proposition which called for die-castings at the rate of about 100 a day, and they had on them more than 40 machining operations. At about operation No. 30 there was a considerable risk of running into a blowhole; if that happened all the work done to that point was lost. Assuming that they were paying something like 2s. per casting and the chance of running into a blowhole was one in five, they preferred to pay 1s. each to have the castings X-rayed individually, after which the probability of running into a blowhole was about one in a hundred.

DR. A. B. EVEREST said he had very much enjoyed Mr. Kayser's talk and the only thing he was left in doubt about was whether he was really speaking as a buyer or a production manager backed by a technical department. His impression was that the whole question turned on technical control. Unfortunately he regarded buyers as enemies. He had worked for many years trying to enhance the status of cast iron, but many buyers did not realize that there was more than one quality of cast iron, and that the cheapest make one could buy. He wondered why makers should try to improve the quality of cast iron, and have a British Standards specification, if the buyer was unable to recognize the different grades. It was unfortunately a fact that he had been approached by big firms who had a casting which had been failing, due to a deficiency in strength. They asked for a recommendation for quality cast iron for that job. Later, on hearing that the castings were still failing, an inspection of the castings was made, and it was found that the buyer thought the cast iron too expensive and had turned to someone who said he could do it just as well at the old price. That was not typical of foundrywork to-day. With the help of the Institute of British Foundrymen, the situation had been rectified to a great extent, so that to-day one could get castings of reputable make.

Technical Control Defined

MR. KAYSER thought Dr. Everest's contribution was a valuable one, for he had put his finger on the right place. He understood there was some difficulty in deciding whether he was a buyer, production manager or technical controller. The query was germane, for he could assure Dr. Everest he had not the remotest idea what he was. His official position was chief technician. One of the people with whom he spent a good deal of time was the buyer, with whom he spent at least three or four hours a week. Sometimes the buyer would say "I think you had better handle this for a bit," and he knew exactly how far to handle a matter before passing it back.

The production manager frequently suggested matters in which they should co-operate. It was usual for him to say such and such operations are giving trouble, what about taking them over? His own department would then take over. They were intimately mixed and they had to be.

THE CHAIRMAN said that it was about time the buyers and the suppliers got together to see if it was not possible to cut down the numerous and voluminous specifications relating to aluminium alloys so that the buyer might have some chance of knowing what he was trying to buy; that not only applied to the aluminium alloys but to many non-ferrous metals. He thought the number of specifications could be cut down without any loss of efficiency, and he was wondering if the Purchasing Officers' Association had ever considered co-operation with the British Standards Institution with a view to a reduction of specifications.

Answering the Chairman's point about the British Standards Institution, MR. HUEBNER replied that the Purchasing Officers' Association did work very closely with this body and were on the list of people who perused draft specifications for comment.

The Buyer's Point of View—Discussion

Patterns

A MEMBER pointed out that the British Steel Founders' Association had recently issued one of their booklets dealing with the buying of steel castings. There they had given the specifications of the British and American standards authorities to help buyers to know what they were getting. Another difficulty in the foundry business concerned patterns. When prices were quoted to buyers they replied that they were ridiculous and that they could get them for much less elsewhere; they did and the pattern was generally unusable. It cost more to make it serviceable than if it had been properly made in the first instance.

MR. LEVY thought the question of patterns was a very wide one. Recently he had been at the works of a big engineering concern who had a well-organized buying department, and a technical division established as another department ancillary to the purchasing department. In that organization an enquiry went out to a number of firms, and the pattern equipment demanded and essential for the job was of the highest possible order. An offer was received for that work for £100 and, although the technical advisers well knew that the class of pattern equipment which they required would cost nearly twice that figure, yet that firm got the order, although it was apparent to the technical advisers that the quoting firm had made a slip. What had the purchasing people to say to that?

MR. HUEBNER replied that the simple answer was that, if the buyer obtained too widely-varying prices, he should be immediately suspicious and, if he was backed by the technical advisers to his company, he would be unwise if he did not query with the tenderers concerned whether there was anything wrong with their tenders which they would like to rectify. Reference back would, no doubt, quickly produce a suitable answer.

There were a number of first-class pattern-making firms in the country, but founders tried to give the impression that the buyer should not purchase a pattern from such firms, but should buy it through the foundry. This only raised a suspicion in the buyers' mind that the foundry wanted to make a profit on the pattern equipment, especially having in mind there was always a very wide variation between the price quoted for a pattern by a foundry and that quoted by a patternmaking firm. It frequently happened that if a buyer placed his order with a foundry for a pattern that he would find the foundry, in turn, purchasing from an outside patternmaker; a buyer would then wonder why the buyer should not purchase direct. From his own experience, Mr. Huebner thought the better way was to say to the foundry that it was the buyer's intention to buy his own patterns, but would the foundry, when tendering, say what they wanted in the way of pattern equipment.

Technical Knowledge

It seemed to Mr. Huebner that a large number of people present at the meeting were thinking all the time of the big firms who employed buyers and who could afford technical backing. This, of course, was incorrect. The vast majority of buyers were operating for small firms without some of the facilities which had been outlined, and he felt that the foundry people were sometimes at fault in that, having offered the buyer a particular specification, they were not always careful to see that he got the material to the specification demanded. Surely here it was a case of the foundry in fact being dishonest, and not that the buyer lacked technical knowledge.

On the subject of specifications, the speaker did feel that something should be done to stop the ever-increasing variety of types of iron being offered and, whilst this was obviously in other people's minds, it was the technical people who were at fault because they could not let matters rest and, as soon as they had perfected one specification, they immediately set to work to bring out another.

DR. EVEREST said, with regard to the question of specification and buying, he thought the point he had in mind was that if a buyer was asking for something special, he had to bear in mind that he would have to pay the right price for it. A technical sub-committee of the Institute of British Foundrymen was doing something about cutting down specifications. There was a committee which was working on reducing non-ferrous specifications and were trying to do the same for cast iron.

A MEMBER said he had found that most foundries bought their patterns because they were cheaper, but what many buyers failed to realize was that, when a thing was cheap, it was often not much good.

MR. HUEBNER said many buyers did not realize the difference there was in patterns and what was needed. In his organization he had a number of young buyers and they were instructed to put on the order what was wanted and not just to refer to "a pattern," but the training for this was long and tedious. It was essential to tell the foundry, when buying, if a pattern was wanted for one-off or 500-off run, whether it was to be experimental or a production run.

Changing the "Leopard's Spots"

MR. PIERCE, referring to the old days, said the procedure was, if buyers wanted castings for anything, they would get quotations and then interview each one of those people separately, and say, "So-and-so say they can make this for 1s. 4d. If you will make it at 1s. 3½d., you can have the order." That was about the worst kind of action that could be taken. That was not intelligent buying, but it was done. He was very dubious about a changed viewpoint and did not feel at all confident that all the assurances he had heard were going to be kept.

MR. MITCHELL said between 1930 and 1935 when there was a real slump, some buyers in those days helped to contribute to that state of affairs, by insistence upon the very lowest price. The situation had changed now and there had been a sellers' market for many years. The Purchasing Officers' Association endeavoured to influence a better viewpoint by training their younger members to recognize that

there was a seller's point of view as well as a buyer's point of view.

A MEMBER thought Mr. Pierce was slightly frightened of getting back to competition. Surely that was what was needed ? In these days of nationalized industries the one thing that was wrong was the fact that there was no competition and he believed that competition was a good thing and the sooner it returned every one would be better off.

MR. BRIGG wondered whether they were not blaming the buyers too much for the lack of buying to a specification. Surely the person primarily responsible for asking for an article was he who was going to use it and it was in his interest for him to enumerate his exact specification rather than the buyer.

Inspection

MR. E. HARWOOD BROWN said Mr. Kayser had made reference to inspection problems and suggested co-operation with the shop producing the article. Unfortunately the majority of foundries in this country were unable to offer any efficient inspection service on the lines suggested. Would Mr. Kayser prefer that the onus should be on the foundry to provide that inspection or would he expect the purchaser to arrange inspection?

MR. KAYSER agreed there was no doubt customers must pay for their requirements. If they need a bar 12 in. long to $\pm \frac{1}{4}$ in., they would pay a certain price. If they said they specified bars 12 in. long $\pm 1/1{,}000$ in. they would have to give a higher price. There was another point which in the past had done much harm, that was the business of "contra-account" which many large firms used to run—"we will buy your castings if you will buy our motors." It was a retrograde action and he hoped it would never come back.

MR. TALBOT commented on the evils of the past when foundrymen suffered at the hands of the buyers and said he thought those days were past. Now, the buyer understood the difficulties of the foundry, and realized that the good foundryman was not out to take advantage of him. He hoped that this understanding would continue.

In the past the buyer sat in his office and sent out enquiries covering his needs. In recent times he had to visit the suppliers and had in consequence become more acquainted with their problems. That, he thought, would stand them in good stead when the competition started again.

Vote of Thanks

MR. J. W. BUTLER, proposing a vote of thanks to the speakers, referred to the cordial relations which existed between the staff of the Council of Ironfoundry Associations and the Purchasing Officers' Association, and expressed the hope that this collaboration would be of mutual benefit to the makers and the buyers of iron castings. The Council of Ironfoundry Associations had produced a set of standard conditions of sale about six years ago, and these conditions were being widely used by ironfounders on their quotation forms and similar business stationery.

MR. PIERCE, who seconded the vote said he would like to couple with it the officers of the Purchasing Officers' Association. He was pleased the secretary and the treasurer, whom they did not see very often, were present. He had every faith in the buyers doing the right thing, but there were black sheep in every flock, and it was they who needed avoiding.

"FOUNDRYMEN'S OPINIONS OF THE BUYER"

The position of host and guest were reversed at a meeting of the London branch of the Purchasing Officers' Association on October 13, when at very short notice Mr. W. R. Buxton, chairman of the London section and a Council member of the Association of Bronze and Brass Founders, deputised for Mr. G. Script in a talk on "What the Foundryman Thinks of the Buyer." He brought with him a practical jobbing foundryman, Mr. A. Talbot, from Western Foundries.

MR. BUXTON opened the discussion in a controversial manner by asserting that most buyers of castings expected perfect results from very imperfect patterns. He said that his Association was trying to educate buyers into the use of British Standard specifications and asked those present, where possible, to quote proper specification numbers when inquiring for castings. He also briefly referred to his Association's conditions of sale, particularly with regard to the rejection period.

MR. TALBOT began his speech by stating that a good buyer was one who knew what he wanted and accordingly gave sufficient information on his inquiry and drawing to enable the foundryman to give a competitive price. Such buyers were quite rarely encountered by his foundry. He humorously referred to the item "pattern to be supplied," which sometimes appeared on orders, and wondered whether buyers were aware of the difference between prototype and production patterns; bad patterns did not make for good castings and he wondered if his clients ever thought how many castings could be made from any one pattern. He told the meeting about the difficulties he occasionally experienced through buyers asking for urgent delivery of castings and then changing their minds after he had made special arrangements to put their orders through. Mr. Talbot said that there should be a closer understanding of the other side's problems and methods of production. All jobbing founders knew what their normal capabilities were. Buyers should not ask them, as a special favour, to undertake jobs for which they were not really laid out, and then afterwards complain that the price was not competitive. In conclusion, he stated that his personal opinion was that the buyer of to-day was more technically minded and tolerant than his predecessor, and he hoped that the meeting would do something towards bringing a closer liaison.

DISCUSSION

When the meeting was thrown open for questions, MR. W. L. WILLARD stated that, in his opinion, the rejection period of three months, mentioned in the A.B.B.F. conditions, was an unfair one, as buyers often bought a supply of castings which would last them for a year or so, and it was quite possible for the last few in the batch to be found faulty some considerable time after their purchase. MR. TALBOT replied that this question of rejects was, surely, one for discussion between the two people concerned and thought an amicable agreement could always be reached. Buyers would only be "caught" once and they usually avoided a repetition by taking their business elsewhere.

ANOTHER MEMBER wondered when foundrymen were going to learn to count, as he often had larger quantities of castings delivered than he actually ordered.

The Buyer's Point of View—Discussion

MR. TALBOT answered that the remedy was in his own hands; he should send the excess back to the supplier.

The question of the difference in charges as between patterns supplied by jobbing foundrymen and patternmakers was also raised, and one of the speakers thought the question hinged upon whether the foundry had a patternshop or not. In any case, he did not think that the cost was very much different.

MR. W. H. NAPPER stated that the subject of conditions of sale generally was one which should be discussed between the P.O.A. and the respective sales bodies, so that both points of view could be ventilated.

MR. BUXTON promised to bring this suggestion to the notice of his own Association.

MR. TALBOT referred to remarks made by a P.O.A. member about the damage caused to patterns when in foundry hands and suggested that buyers should see that their patterns were properly made in the first place with proper provision for lifting them out of the sand. Protection against wear and tear was also needed.

In conclusion, the branch chairman, MR. C. F. HUEBNER said that if the purchasing men gave the foundrymen all the assistance and information they could, they would get the best out of them in the long run, with mutual benefit.

Substitutes for Nickel Plate

Owing to the present shortage of nickel, it is being found difficult, if not impossible, on many types of article, to produce a nickel deposit sufficiently thick to give sound protection under service conditions. As a result there is intense interest in possible alternatives to a heavy coating of nickel as an undercoat to chromium plating for ordinary decorative and protective purposes. Although some alternatives are at present being applied in service, there appears to be little or no reliable comparative information as to their performance.

Unfortunately, because accelerated corrosion tests (by which different types of deposits might be compared), are unreliable, the only acceptable method is to place a large number of samples in several differing atmospheric corrosion sites and to average the results. The British Non-Ferrous Metals Research Association has accordingly instigated a large-scale investigation on these lines. Over a thousand sample steel stampings have been plated by various processes and are being exposed at three atmospheric exposure sites, representing a marine and two types of industrial area, mild and severe. A further set is being subjected to an accelerated corrosion test for comparison purposes. These tests will, in a few months' time, yield valuable results on the performance of the various type of finish employed.

Metals Economy Still Urgent

Supplies only sufficient for Essential Needs

The need for economy in the use of alloying and non-ferrous metals is still urgently necessary. This was emphasized in the first report of the Metals Advisory Committee, set up by the Minister of Supply in conjunction with the Minister of Materials in August, 1951, to study ways in which scarce metals could be saved in industry.

The shortage of these metals, which threatened British industry last year, was reported to be no longer critical, but supplies of many metals were still only sufficient for essential needs and there was little margin to meet unforeseen demands, or a possible deterioration in the supply situation.

The chairman of the committee is Mr. D. A. Oliver, director of research of the B.S.A. group of companies, who acts as metals economy adviser to the Ministry of Supply and the Ministry of Materials. The report has been accepted by the Minister of Supply and the Chancellor of the Duchy of Lancaster in his capacity as Minister of Materials. They have arranged for Mr. Oliver to continue as metals economy adviser and for the committee to continue its work under his chairmanship.

United Kingdom Supplies

The report pointed out that the expansion of world production and the operation of the International Materials Conference had increased, beyond expectation, the supplies of non-ferrous metals available to the United Kingdom in 1952. At the same time, demands had been reduced because of the slower rate of build-up in western defence programmes than was formerly expected; by economies made in industry; by Governmental restrictions in the use of metals and by the shortage of steel (which had caused a drop on the demand for associated metals).

Only in the cases of lead and zinc, however, had the metal shortage of 18 months ago entirely disappeared. Nickel, cobalt, and copper, in particular, were still causing concern, and a sufficient supply of other metals for essential purposes could be maintained only by restrictions on less-essential uses. Although on current forecasts Britain could expect to get through the next two years without any serious metals crisis, this might prove to be too optimistic a picture. There was little margin in estimated supplies to meet unforeseen demands, or to build up stocks to offset any possible shortfalls in supply due to causes outside the United Kingdom's control.

In assessing the demand for the main metals, some allowance had been made for increased production in the metal-consuming industries, but if the rise in production was greater than foreseen (and it must be hoped that this would be so) the demand for metals would be intensified, and one factor affecting supplies was inevitably the United Kingdom's balance of payments position. For these reasons, the importance of continuing and extending economy measures could not be over-emphasized.

The report reviewed the work done by Governmental and industrial organizations to promote metals economy, and paid tribute to private firms. It was through the efforts of industry itself, that the greatest economies could be made, and industry had been fully alive to the importance of economy, and had done much to reduce its requirements of scarce metals by re-designing products, substituting more-readily-available materials, and by other methods.

Some slackening off in the drive for economy could be expected, however, as a result of improved supplies and it was, therefore, vital, the report urged, that the fullest publicity should be given to the continuing urgent necessity for making the best and most economical use of metal supplies. The committee recommended that Government research establishments and research associations should continue to experiment on the better and more economical use of metals; that defence departments should ensure that designs and specifications for defence material were drawn up so as to achieve the maximum economy of metal; and that as much information as possible on future supplies of metals should be given to industry at regular intervals.

(*Continued at the foot of Col.* 1)

European Foundry Productivity Conference

Details of the Sessions

As briefly announced last week, the first meeting of European foundrymen to discuss methods of increasing productivity was held in Paris from November 5 to 8. This conference, sponsored by the Organization for European Economic Co-operation, was arranged by the *Centre Français de Productivité* and the *Syndicat Général des Fondeurs de France*. Some 86 delegates, from 13 countries, attended and the British contingent was as follows:—Dr. H. T. Angus (Grey Ironfoundry Productivity Team), Mr. J. W. Butler, secretary (Council of Ironfoundry Associations), Mr. P. Candor (Westinghouse Brake & Signal Company, Limited), Mr. Frank Hudson (leader, Brassfoundry Productivity Team), Mr. E. C. Mantle (Brassfoundry Productivity Team), Mr. K. Marshall (director, Council of Ironfoundry Associations), Mr. W. R. Marsland (president, Association of Bronze and Brass Founders), Mr. F. A. Martin (leader, Steel Founding Productivity Team), Mr. N. P. Newman (chairman, Council of Ironfoundry Associations), Mr. A. MacDougal (chairman, Amalgamated Union of Foundry Workers), Mr. G. W. Nicholls (Grey Ironfoundry Productivity Team), Mr. S. H. Russell (leader, Grey Ironfoundry Productivity Team), and Mr. A. N. Wormleighton (joint secretary, Brassfoundry Productivity Team).

The first meeting opened on the morning of November 5, when statements were made by Mr. N. P. Newman (Great Britain), Mr. G. Halbart (Belgium), Baron A. Krayenhoff (Netherlands), and Mr. C. Longaretti (Italy) on the action taken in their respective countries to apply American productivity experience.

French Pilot Foundries

The second meeting, on the afternoon of November 5, was entirely devoted to a description of the French foundry productivity experiment by the originator of this scheme, Mr. R. Christa, of the *Syndicat Général*. In brief, the scheme entails the creation of 10 pilot foundries laid down on American lines, in which an endeavour will be made to give management and employees in these plants the American outlook towards increased productivity. After the foundries have been in operation for some time, a comparison will be made between these experimental pilot plants and normal French foundries. Great emphasis is laid on the necessity for giving management and employees this new outlook, and this is being done by special training methods at regional centres. The training will deal in principle with the whole personnel of all the foundries, but in view of the number of employees involved, it is only given in the first instance to management (owner, managing director or foundry manager), the future key-man responsible for training the employees (termed the "animateur"), and an assistant to the key-man. Training methods are extremely thorough and, as well as dealing with such subjects as work simplification, great importance is also attached to essential requirements needed for putting over a subject, *e.g.*, how to speak, how to convince, human relations, etc. The training period for the various courses covers one week for management, six weeks for the "animateur," and four weeks for the latter's assistant. The scheme is undoubtedly commendable, but whether it works only time will prove, and it will be interesting to see the results obtained in, say, 18 months' time. In creating a new attitude of mind, teaching is only part of the story, and one wonders what will happen when this new outlook demands a higher standard of living, and whether the Government of France is capable of economically meeting this demand.

Human Relationships

The third meeting of the Conference, held on the morning of November 6, dealt entirely with the subject of improvements in human relationship and many interesting suggestions were forthcoming from the papers presented and resulting discussions. One French foundry pointed out that they employed a lady assistant to their welfare officer, and it was the duty of this lady to visit the families of all employees so that the management could be kept in touch with the social conditions of their workers. It was left to the discretion of this lady as to what was, or was not, told to the management, but the experiment had been a great success so far as this particular foundry was concerned. Mr. F. A. Martin, leader of the British Steel Founding Productivity Team, also contributed a statement at this session outlining some of the steps being taken in the Sheffield area to improve human relations between the employees of competitive steelfoundries. The afternoon of November 6 was devoted to works visits, which included the Renault motor-car works and the Société Industrielle des Fonderies d'Aluminium.

The remainder of the conference was given over to the presentation and discussion of technical papers dealing with foundry organization, layout, mechanical aids, moulding and sand-handling methods, patternmaking processes, fettling methods and other productivity achievements of special interest, together with technical advisory services in foundries and their rôle with regard to increased productivity. At these sessions, members of the British delegation presented the following papers:—"Simple and Inexpensive Mechanized Layout for the Small Jobbing Foundry," by Frank Hudson; "Mechanical Handling of Foundry Materials and Moulding Equipment," by G. W. Nicholls; "Use of Aluminium Pattern-plates in the United States and their Development in Great Britain," by E. C. Mantle and P. Candor; "Use of Flexible Cutting-off Wheels," by C. A. J. Timms (presented on behalf of the Author

by Mr. A. N. Wormleighton), and "Operation of a Free Technical Service to Foundries," by Dr. H. T. Angus.

French Foundry Industry Organization

During the Conference, a visit was also made to the new central laboratories of the *Centre Technique des Industries de la Fonderie* at Sèvres, on the outskirts of Paris. The *Centre* is supported by every foundry in France, regardless of the type of casting being made, and is financed by a 0.4 per cent. levy on turnover in return for which every foundry is entitled to the use of all available services without further cost. The new central laboratories at Sèvres are extremely well designed and incorporate a very good experimental foundry. Furthermore, this laboratory is being equipped with up-to-date apparatus and it is interesting to note that a mobile X-ray unit is on order which will be able to visit any foundry at short notice. In addition to doing research work and providing technical assistance, this central laboratory looks after routine analyses and control tests for many foundries in the Paris area, representing about 33 per cent. of the total output of castings in France. Mention should also be made of the department devoted to the thermal-testing of domestic cookers, fires and heating apparatus. As a result of work in this direction, the efficiency of such equipment has been raised from about 40 to 70 or 80 per cent., with the consequent saving of millions of tons of coal. This laboratory forms the hub of a series of regional laboratories which have been in use since 1945, at Roubaix, Charleville, Nancy, Saint-Dizier, Lyon, Marseilles, Bordeaux, Rennes and Rouen.

Conclusions

The main conclusion to be drawn from this first European foundry productivity conference is the importance of ensuring that management and employees co-operate in promoting the right attitude of mind towards increased productivity. Without this new outlook, best results from mechanization and mechanical aids are unlikely to be achieved. The progress of the French foundry productivity experiment in this direction will be followed with great interest, and it is hoped that the results obtained will be disclosed in due course. Finally, one cannot fail to be impressed by the spirit of co-operation which exists between all sections of of the foundry industry in France and in the way they support research and development activities through the *Centre Technique*. The proceedings of this conference will be published in due course and these will be worthy of close study.

THE BOARD of Alquife Ore Company, Limited, has received an offer for the purchase of the share capital of the Alquife Mines & Railway Company, Limited. The board has accepted this offer subject to final details being agreed, a formal contract being signed, and the approval of the British and Spanish Governments and of the shareholders.

House Organs

Malleable Iron Facts. No. 44. Published by the Malleable Founders' Society, 1800, Union Commerce Building, Cleveland 14, Ohio.

This is a much larger issue than usual and carries the Paper which Mr. James H. Lansing, the director, presented to the 1951 Brussels International Foundry Conference.

The Iron Worker. Published by the Lynchburg Foundry Company, Lynchburg, Virginia. Autumn, 1952.

The high standard achieved by this house organ is well maintained in its Autumn issue. The feature article is about the city of Norfolk in Virginia, claimed to be the world's greatest naval base. On the technical side, a full illustrated article covering the sand reclamation plant is printed.

Peco Products. Published by The Projectile & Engineering Company, Limited, Acre Street, Battersea, London, S.W.8.

There are but two articles in this four-page leaflet—one on injection moulding for plastics, and a second on die-casting. The latter is a discussion on slow as opposed to fast injection speeds, and is so interesting that the reviewer recommends his readers engaged in this branch of industry to write to Battersea for a copy.

Carron Cupola. Vol. III, No. 4. Published by the Carron Company, Falkirk.

This issue contains the news that the Carron Company has purchased a controlling interest in the patents and processes of Mr. Conrad A. Parlanti, and these have been vested in a new company styled Carron Parlanti, Limited. It also reports the appointment of Mr. F. Bates as production manager. He has been an associate member of the Institute of British Foundrymen since 1945.

News Letter. Journal of the David Brown Companies, Vol. 4, No. 11.

The David Brown Companies are located in towns spread all over the country, and this adds very considerably to the Editor's task in maintaining interest, for a social event by one of the concerns has but little news value for another works a couple of hundred miles away. Yet by picking out the main items of news, he does manage to achieve almost the impossible, by stressing major developments within his organization such as the acquisition of Meltham Hall; the motor show; and Coryton activities.

Indian Steel Plans

The Government of India is understood to have rejected German proposals to instal pig-iron plant which was to use the Krupp-Renn process. Proposals for an integrated iron and steel plant which would cost Rs.80 crores (£60,000,000) are being discussed with American and Japanese interests.

No decision has been taken whether the proposed industry should be located in Orissa or Madhya Pradesh. The final choice will be made after surveys to decide the best site, bearing in mind transport facilities, the quality of the ore, and the extent to which the States are prepared to share in financing the project.

Economies in the Foundry

Well-attended B.C.I.R.A. Conference at Ashorne Hill

Towards the end of last month, a conference on economies in the foundry was very successfully organized by the British Cast Iron Research Association, from a Monday afternoon to Wednesday morning inclusive. All sessions were well attended, with the younger technicians showing a welcome preponderance among the 200 or so registrations. Proceedings began with a welcome by the Association's president, Dr. J. E. Hurst, who mentioned that the idea for holding such a conference originated with Mr. R. L. Handley. Next, the president quoted interesting figures for the foundry industry where, hitherto, in post-war development schemes, labour utilization had been the dominant theme. Pre-war, the conversion value of raw material to finished product in the foundry industry was about 50/50, and 40 per cent. of the finished items' overall cost was still represented by raw materials. Thus, economies in material usage ranked of equal importance to labour in the balanced economy of the foundry. Furthermore, such economies as a lowered scrap percentage were cumulative both as regards material and labour.

Pig-iron Resources

Following his introductory remarks, Dr. Hurst launched immediately into the first item on the programme, which was a discussion of pig-iron resources and supply, the president himself speaking from the makers' point of view. He decided to skip the historical classification of pig-iron and many of the now obsolete brands and gradings and reviewed the present position on the basis of the Ministry of Supply's five groups. Of these, over 50 per cent. of the foundry's requirements were Group I—pig-irons containing over 1.0 per cent. phosphorus; from Group II irons, with less than 0.1 per cent. P, ingot moulds for the steel industry and hematite-base mixtures for malleable were the main consumers. Group III irons were the main source of material for high-duty iron castings and comprised (*a*) the 0.2 to 0.4 per cent. P irons, *e.g.*, Ford iron; (*b*) 0.4 per cent. P irons, represented by the Staffordshire varieties; (*c*) Scotch irons, and (*d*) medium-P foundry irons now produced for sale in negligible quantities. Group IV irons included the so-called cold-blast pig-irons and were mainly used for rolls and chill castings, and the final group (V) included specialist types in (*a*) refined malleable, (*b*) cylinder, and (*c*) ordinary malleable qualities.

The president then exhibited a series of tables showing how the pattern of consumption of the various irons was changing and revealing, when pipe, ingot-mould and malleable production was excluded, that usage of low-P varieties had substantially increased for ordinary foundry purposes at the expense of the high-P irons, and that the increase was mainly in hematite. These tables were followed by similar records of the pattern of pig-iron production, in which, for all cases except hematite, the supply had followed the demand. Fifty-five per cent. of ordinary foundry requirements were now of the low-P varieties. Dealing with raw materials, it was explained that all the hematite and low-P irons were produced from imported ores, and their furnishing comprised a job extremely well done by the supply Ministry. Other comments made by Dr. Hurst referred to plant capacity and the trend to larger furnaces for greater economy with leaner ores; a survey was in progress to forecast requirements for the next five and 10 years; compositions had followed the old regional types despite manufacture being from imported ores; refined irons had helped to bridge the shortages of hematites and furnace capacity for low-P irons had not expanded, though plans were prepared. An increase in silicon in pig-irons generally was desired by consumers and steps were in hand to provide this to a limited degree.

Pig-iron Users' Viewpoints

The complementary subject next discussed was "Pig-iron Resources and Supplies from the Users' Point of View," with which Mr. P. A. Russell coupled considerations of metal economy and scrap utilization. The biggest economy open to founders, said Mr. Russell, was in increasing the yield of good castings—a 1.0 per cent. overall improvement would, quite apart from more-obvious economies, save 5,000 tons of iron annually. A list of possible metal economies would thus run: (1) reduced scrap; (2) re-proportioning of runners and risers; (3) reduction in over-melt, and (4) less pour-down. Regularity and consistency of supplies were more important than actual compositions, and here Mr. Russell voiced several complaints. For instance, he reported that for the carbon contents in hematites and pig-to-pig silicon variations in most irons, the tolerances were increasing. Of the trend in such matters, silicon always seemed to be lower than specification, phosphorus always higher, and manganese content particularly variable in hematites—which latter was of major concern for malleable ironfounders. Blast-furnace iron seldom coincided with eutectic compositions and carbon-equivalent values varied widely; moreover, high-carbon and high-silicon irons were in very short supply. To add ferro-silicon to his metal cost the ironfounder 16s. per ton per ½ per cent., yet the pig-iron price only reflected 5s. per ton per ½ per cent. for hematites. Was it possible Mr. Russell asked, for pig-iron producers to revise their schedule and, if necessary, widen the margins between high- and low-Si irons? Again, increased production and usage of low-P irons would make founding easier and reduce scrap—the price differential of 1s. 7d. per cwt. could easily be offset by economies in foundry methods brought about by using low-P irons. Similarly with scrap, the proper

diversion of good scrap to foundries would be a big help—that meant good steel scrap, too—but again the price differential for the merchant did not provide any incentive for proper selection.

In concluding, Mr. Russell listed desirable improvements as: (1) the pig-iron producers should revise gradings and base them entirely on Si, P and Mn, and new price structures should be agreed; (2) such re-grading should include consideration of C.E. value; (3) co-operation between founders and producers should be improved; (4) he alleged that founders have, because of shortages, had to accept inferior material, and producers had taken advantage of this state of affairs, and (5) why could not more research be devoted on methods for the elimination of phosphorus or its neutralization?

Considerable general discussion next followed. Dr. Hurst said that as the pig-iron supply position improved (and improvement was imminent), customer "pernicketyness" would return; another factor besides price which affected the silicon content of pig-irons was the limitation of coke supplies to blast furnaces. Other points concerned a controversy as to whether phosphorus contributed wear resistance and the use of hematite to confer high carbon. Here, a user with 12 months' experience of basic cupola operation stated that his carbon pick-up problem had been solved. Another speaker reported that, for chilled-iron production, sand-cast pig-iron was better than machine-cast of identical composition, but it was explained that sand-casting was a physical impossibility with high-output blast furnaces.

Shell-moulding Process

After a short break for tea, the Monday afternoon's programme was continued with a talk by Dr. J. G. Pearce, director of the Association on the shell-moulding process. This was an impromptu arrangement introduced because Mr. J. J. Sheehan was unable to give his scheduled paper "Conservation and Correct Use of Low-phosphorus Pig-iron," owing to sudden indisposition. That the new arrangement was topical and opportune was well borne out by the pertinent and protracted discussion which followed Dr. Pearce's remarks. In substance, these were similar to those given earlier at the Joint Iron Council's Convention (reported in the JOURNAL, October 31, 1952). He concluded by saying that it was now possible to produce in nodular-graphite iron a tensile value of 35 to 40 tons per sq. in. as well as considerable elongation, and this in conjunction with the shell-moulding process opened up many new possibilities for cast products.

Mr. W. B. Parkes, who spoke next, outlined some details of the shell-moulding process. Clean accurate castings were the result, he said; pattern costs were much higher than for ordinary castings and close-grained cast iron or steel were suitable pattern materials as well as copper-base alloys and sometimes aluminium, though the latter was unsuitable for long runs. Proper provision of lifting pins and a uniform section of pattern seemed important; fastening the shells together was a little difficult, sometimes edge clamps were used or, in America, jolt-rammed shot was used for backing. In the United States, vertical casting was practised but here the horizontal method was in vogue. Runners could be smaller than normal; 5, 6 or 7 per cent. of resin (usually phenolic) was required to bond the fine sand selected and no venting was necessary. Costs were said to be higher than for established methods of casting, but economy in machining was the proper criterion by which to judge possible applications.

In the continuing discussion, a user of the shell-moulding process said no trouble had been experienced with swelling of the assembled shell-moulds or "biscuits," when D-clamps were used for fastening; he found the process cheaper than green-sand moulding and, when pouring H.R. Crown Max steel, an accuracy of 0.005 in. per in. in the same half-mould and 0.007 in. per in. across the joint could be realized. Other facts elucidated in discussion concerned the recommendation of a silicone grease for use as a parting medium (even then difficulties were sometimes experienced with new patterns); stoving temperatures of 260 to 315 deg. C. (500 to 600 deg. F.) were suitable, as was a mixture of Chelford and Redhill fine sands—the finer the sand the more resin was required; sticking could be obviated by rapid processing and less fume was evolved from shell-moulds than from block-core moulds.

Foundry Coke

The final paper of Monday's session was on coke supplies and quality—the present position, by Mr. J. W. Grant. The Author first reviewed the main requirements of a good foundry coke, which he listed (*a*) as a fuel for providing heat; (*b*) to provide carbon in particular for chemical process reactions, and (*c*) as a supporting medium for the charge. It was generally understood that cupola coke should be of large size and high strength, but opinions on the various coke specifications varied, though useful values for a coke's performance could be gained by provisional laboratory tests.

Next, discussing the drop in quality of coke in post-war years, the immediate remedial steps to be taken and the outlook for the future were considered. Against the need for expanding production and securing high outputs from existing plant, was the contradictory requirement of wide coke ovens, careful preparation of the charge and long firing cycle which were aids to good *foundry* coke production. It was apparent that in the future some attempt will be made to recognize the special requirements of foundries by blending to make best use of the remaining coking coals of the country, but little improvement could be expected in the overall position—which in itself was still vastly superior to that obtaining in most foreign countries.

There was little discussion to follow this paper, as it seemed that founders appreciated the position

and must accept it *force majeure*. With deteriorating coke, it was said, the advantages of hot-blast cupolas became more obvious. One member, stressing that British founders did not really appreciate how well off they still were with present-day supplies, quoted experience with Indian cokes of over 25 per cent. ash; even then, good melting practice was possible when steps were taken to force sufficient air through the charge and to ensure proper slagging and metal-charge to coke ratios.

Moulding Materials

One of the most stimulating papers, when members reassembled for the Tuesday morning session under the chairmanship of Mr. E. Wharton (Staveley), was the initial contribution by Mr. W. B. Parkes on the economic use of moulding materials. His first theme was that it is poor economy to try to incorporate a sand containing much "burnt" clay in new mixtures—it led to extravagant use of extra clay to get adequate green-strength. This feature, however, did not apply to core-sand, which Mr. Parkes considered was well worth saving and often needed but little by way of additions to make it serviceable at least for block-cores or the body portion of large cores. A recurring query from founders often related to how much new sand a foundry should use. The speaker qualified his reply according to the clay content and other properties of the new sand available—the yardstick being that additions should be just sufficient to maintain values for the well-known laboratory tests at levels which had been established as necessary for a particular foundry's methods of working. Synthetic sands were described as only suitable for use in foundries where adequate testing and control facilities existed.

Practical moulding materials economies were then listed as follow:—For natural sands, (*a*) use a high-clay sand as an additive (if the permeability fell too low, it was better to buy clay); (*e*) much of the cost of sand was transport (again, it was cheaper to add clay), and (*c*) much of the clay in red sands was in the form of pellets, often not broken up and therefore wasted—passing through a good disintegrator was a real economy. For core-sands (*a*) a common fault was to use too much of expensive binders; (*b*) block cores were almost "expensive luxuries" from the material point of view. The main reasons for excess binder being used were cumulative in effect—too much green-strength was often wanted; cores should not need to be carried around so much when "green." The use of an air-drying mixture or hot sand led to extravagant use of binders, which were added to delay the drying-out; excess binder was frequently used to mask inefficient drying practice or plant; poor measuring instruments led to excesses, "to be on the safe side," and, when a clay was added to a core-sand to give increased green- and hot-strength, more organic binder was necessary to cover the clay particles.

Notwithstanding anything he had said earlier, Mr. Parkes closed by emphasizing that the most expensive way of using moulding materials was to make scrap castings!

Discussing the Paper, a member wanted to know if a resin bond from a core-sand could be recovered, the answer being in the negative; another query, concerning optimum milling time, brought the reply that this was seldom attained in practice, under-treatment being usual. Summarizing other replies, it was disclosed that it was better to add clay as a slurry and coal-dust, too, could be incorporated in this manner if desired; additions to sand on the floor should be limited to natural sands; lumps of old cores were less troublesome than coke breeze for the lightening and venting of large cores; the Sandslinger acted as an efficient rubbing medium for the sand handled by it, and minimum routine testing requirements should be aimed at establishing a satisfactory green-strength to shatter index ratio.

Fuel Economy

Next on the programme was a discourse on fuel economy and melting practice, by Mr. J. M. Hullock, who is associated with Sheepbridge Stokes Limited. For good practice, the overriding recommendation was to use well-checked raw materials under controlled established conditions, and to enlist the active help of *all* operatives to this end, for, if the founders' metal were incorrect, all other skills were wasted. Often, however, melting departments were inadequately staffed. The main points developed by the Author were that the buying office should not be allowed to dictate on material purchases; "doctoring" with expensive alloys to increase the factor of safety was condemned, and alloy use, in general, should be carefully reviewed. Shortages of one particular grade of iron could usually be counteracted by the development of alternative grades, with the customer's co-operation. The use of bought-in scrap was not recommended.

The Author's practice was to use borings in the cupola, packed in canisters, to the extent of up to 20 per cent. of the charge; this constituent then cost £6 per ton inclusive. The cans were 6 in. dia. by 10 in. deep, with a sealed-in lid, and held 16 lb. when filled loosely. Consolidating by a jolt-ramming device increased the weight to 20 lb. per can.

Finally, the speaker added pointers to good melting practice on such matters as metal heat wastage in the ladle; coke *variation* was the "nigger" in the "cupola"; chipping away of slag from the lining of a cupola after the melt was important, but penetration of the refractory must be avoided; lumps of coke covered by ganister facing could be used instead of brick-ends for filling in holes in the melting zone; *weighing* the coke was important.

Much of the discussion following this paper concerned the utilization of borings which, properly, should have been referred to the special session on this matter to be held later in the conference. Other details put forward included the substantial economy in coke which followed in the train of the adoption of "well-less" cupola and the value of arranging a "tunnel" of steel scrap in the coke bed, when igniting a cupola by means of the "flame-thrower" type of equipment.

Economies in the Foundry

Carbon Pick-up

As the penultimate contribution to the morning session, Dr. H. T. Angus gave a very factual summing-up of the conditions governing carbon pick-up in the cupola. He began by mentioning that recent research had revealed that deficiencies in sampling for analysis often resulted in carbon figures as much as 0.5 per cent. low being returned by foundry laboratories; this, *inter alia*, affected the silicon requirement for a eutectic iron. Between the two wars there had been a tendency to use and develop low-carbon irons, but nowadays the limitations of this trend were realized and there was a reversal of opinion. However, shortage of high-carbon pig-iron and poor coke all tended to give lower than optimum carbon contents—hence the present emphasis on carbon pick-up.

Dr. Angus then listed the conditions affecting carbon pick-up in the cupola. Included in those favouring good pick-up was a high coke bed, for short "blows," or a generous coke ratio of between 6 to 1 and 8 to 1 for long "blows." Four to five pounds of extra solid carbon were required to carburize each 100 lb. of steel melted. Low-ash, low-reactivity, and high-shatter values for a coke were best suited to high pick-ups. Hypo-eutectic irons, calculated from the basis of:—Carbon Equivelent $(C.E.)=T.C+\frac{(Si+P)}{3}$ favoured pick-up of carbon during melting, while hyper-eutectic irons were difficult to carburize. Experiments on the effectiveness of adding carbon to metal baths were next described and related to the carburization of air-, electric-, and rotary-furnace melts. Various practical methods of adding the desired carbon were listed.

With regard to cupola developments, both the innovations of hot-blast and basic linings favoured high carbon pick-up. Charge resistance in cupolas should, if necessary, be overcome by using high-pressure air and thin, fluid slags, so as not to mask the incandescent coke, were desirable. These aspects were also stressed in the general discussion, as were the effect of addition of calcium carbide; the tendency of metal to approach its eutectic composition; the effect of alloy additions and the phenomenon of chilling capacity of a melt in relation to newly acquired carbon.

Conservation of Alloys

To conclude the morning session, Dr. J. G. Pearce reported facts concerning committee work on the establishment of priority uses and compositions for alloy cast irons. This had originated, nationally, during the period of acute alloy scarcity, which, happily, now seemed to be passing. He then quoted from the list drawn up by the committee, ranging from austenitic irons for corrosion and heat resistance, through acicular, martensitic, ferritic and white cast irons, for all of which the proper proportions of alloys considered essential were specified. No alloy additions were considered necessary for engineering grey irons of Grade 17 and below.

(*To be continued*)

Scottish Foundry's Appeal Fails

The first division of the Court of Session on November 18 gave judgment in the action brought by an American company and a Northern Ireland company for an interdict against a Scottish firm arising out of alleged infringement of the patent rights in a jute-spinning frame. By a recent decision of Lord Sorn in the Outer House, James F. Low & Company, Limited, Monifieth Foundry, Monifieth, were interdicted from making yarn from jute sliver according to certain processes and from making or selling certain types of machinery. This was obtained at the instance of Ludlow Jute Company, of Boston, Mass., and James Mackie & Sons, Limited, textile machinery manufacturers, Belfast, who complained that defenders were manufacturing in large quantities spinning frames constructed and worked to the methods described in a Patent granted to them. The defenders denied the infringement, maintaining that the letters patent were invalid, and when they appealed to the First Division against Lord Sorn's decision it was mentioned that contracts for the export by the Scottish firm of jute spinning machinery were worth £2,000,000. As stated, the Court adhered to Lord Sorn's judgment except for a variation regarding "crimping."

Latest Foundry Statistics

According to the October Bulletin of the British Iron and Steel Federation the slight recession in employment in August in ironfoundries was reversed in September when there was an increase of 389, bringing the total up to 153,328, as against 150,015 in September, 1951. Steel foundries also made a noteworthy increase of 128, bringing their total to 20.446. At that figure there has been an increase of over a 1,000 during the past twelve months. The average weekly production of liquid steel for the making of castings during last September was of the order of 11,500 tons, showing a big jump over the August figure—no doubt influenced by holidays, when the make averaged 8,900 tons. A year ago the corresponding output was 10,000. This year the average weekly production of finished castings is recorded as being 6,000 tons—that is over 300.000 tons a year—an amount well in excess of the 1951 output.

Midlands Steel and Employment

Complaints about the shortage of steel were becoming fewer but there was still a "lag" in the heavy type of steel, Mr. F. C. Limbrey, deputy regional controller Ministry of Supply, said on November 18 when the Midland Regional Board for Industry met in Birmingham. The shortage was being made good by the rearrangement of production programmes and by overseas purchases. Major C. R. Dibben, chairman, said the Board found it impossible to forecast future development because of the many "imponderable factors."

In ironfounding there were 323 fewer vacancies in the region and 701 more placings in October than in September. In other sections of the iron and steel industry, demands were fewer by 405 and placings higher by 960. More labour was still needed in iron and steel melting and rolling (80), forging (150), and tube-making (91). In October, 1,182 workers in the region were discharged as redundant and on October 13 there were 16,750 wholly unemployed persons.

News in Brief

TEESIDE BRIDGE & ENGINEERING COMPANY, LIMITED, are to carry out extensions to their foundry in Marsh Road, Middlesbrough.

CONTRACTS for two dredgers have been received by the Renfrew firm of Lobnitz & Company, Limited, in the face of keen competition.

IT IS ANNOUNCED that lessons in business management may become a part of an engineer's training at Loughborough College, Leicestershire.

G. P. KERSHAW & COMPANY, LIMITED, have had plans approved to erect a new foundry at Granville Works, Canal Street, Stockport, Cheshire.

CANNON IRON FOUNDRIES, LIMITED, have recently opened up a new company in Belgium for the production of a new type of kitchen gas stove which is of revolutionary design.

LARGE DEPOSITS of lead, zinc, sulphur, and copper have been discovered at Bleikvassli, Helgeland, in northern Norway. Mining had previouslv been carried on in the area on a limited scale.

FERRANTI, LIMITED, HOLLINWOOD (*LANCS*), have completed a transformer for the Yorkshire Electricity Board, which, it is claimed, will be the largest transformer in service in Great Britain.

H. FORREST & SONS (ENGINEERS' PATTERN MAKERS), LIMITED, will lease land and buildings in Bradman Road, Kirkby Trading Estate, Liverpool, for use as a foundry, machine-shop and patternmaking shop.

THE SALES of the Croft Process for the economic utilization of swarf in the cupola are being handled abroad by the International Meehanite Metal Company, Limited, of 66, Victoria Street, London, S.W.1.

THE DARLINGTON FORGE, LIMITED, have completed an order worth 45,000 Canadian dollars for 11 steel castings ranging from 11 tons to 23¼ tons, and totalling 170 tons. The castings are needed for a 7,000-ton forging press.

A CONVEYOR BELT made by the British Tyre & Rubber Company, Limited, London, S.W.1, was recently taken out of service after carrying 4,000,000 tons of ore at the works of Dorman, Long & Company, Limited, Middlesbrough.

LARGE ORDERS have been obtained recently by Fredk. Parker, Limited, Leicester, for equipment for road and airfield construction and the production of asphalt and tarmacadam. The most recent contract was for a large crushing plant for Kenya.

IN ADDITION to the 114 semi-skilled workers who last week-end finished their employment at the works of Jowett Cars, Limited, Idle, Bradford, the continued trade recession has resulted in a further 343 being under notice to finish this week.

SUBJECT to the recommendation of head-teachers, Derby and District Association of the Engineering and Allied Employers' National Federation are to award annual prizes in engineering subjects to boys in Derby grammar and secondary schools.

DURING OCTOBER, steel output in the Sheffield area averaged 47,600 tons of steel ingots and castings a week. This was 5,000 tons a week more than in October, 1951. October output was slightly less than the previous month's, when the weekly average was 47,900 tons.

A NEW fluorescent flaw-detection ink, Lumor, produced by Manchester Oil Refinery (Sales), Limited, Trafford Park, Manchester, consists of a suspension of fluorescent magnetic material in a special liquid medium. It is easy to use on both large and small parts. The new product is particularly useful because of the marked contrast of flaw indication when viewed under an ultra-violet light.

AN OUTBREAK of fire at the premises of Yewco (Foundry & Engineering), Limited, Eccleshill, Bradford, last week, destroyed some patterns, burnt a square yard of floor-boarding and damaged part of the roof. It is believed that the fire may have been caused by a spark from a slow-combustion stove on the ground floor. It is not expected that production will be much affected.

A HIGHLY SUCCESSFUL course of instruction, believed to be the first of its kind run by a commercial organization, was held recently at the works of Leicester, Lovell & Company, Limited, North Baddesley, Southampton. The course was specially designed for members of the boatbuilding industry and dealt with synthetic-resin glues and their use in the construction of boats and boat fittings.

A. LUSON & SONS, LIMITED, in announcing a new vulcanized-rubber-bonded wire rotary brush termed the "Gem," reproduce part of an independent test report on the brush, stating that "the sample has been in use for a total of 364 hours, whereas 90 hours is the average life of an ordinary brush, and although the wire had worn almost to the rubber mounting it had retained its shape and had no sign of distintegration."

FAIRFIELD SHIPBUILDING & ENGINEERING COMPANY, LIMITED, have secured the contract from Canadian Pacific Steamships, Limited, to build a passenger and freight liner for the Liverpool-Canada service. The new vessel will be of 22,500 gross tons, with a service speed of 21 knots. The Fairfield yard now has 16 ships on hand totalling about 180,000 tons gross. The Clyde are now building six large passenger liners of 130,000 tons gross.

A PLEA for a new perspective in the relationships between foremen and those working above and below them in industrial management was made in Glasgow on November 19 by Mr. W. H. Bower, assistant director of the technical services section of the Industrial Welfare Society. He was addressing a joint general meeting of works foremen and the Training Within Industry Association for Scotland. Between 30 and 40 firms from all over Scotland were represented.

EMPLOYEES of W. & T. Avery, Limited, came from as far afield as Aberdeen and Newton Abbot to receive long service awards at the Soho Foundry, Smethwick, on November 19. Sir Walford H. Turner, chairman of the company, presented £50 cheques to eight 50-yr. service veterans, and gold watches and certificates to 15 employees who had served for 40 years. Sir Walford said that since the long service presentations began ten years ago, there had been 106 awards for 50 yrs.' service, and 186 for 40 yrs.' service. There had been a total of 1,528 for 25 yrs. upwards.

AN APPEAL for the return of the large, cheery kitchen as the focal point of family life was made on November 19 by Miss I. S. Gibson, principal of Glasgow & West of Scotland College of Domestic Science, when opening an exhibition of cookers, stoves, and other domestic fuel-burning appliances in the Scottish Building Centre, Glasgow. While commending the good line and colour of modern streamlined appliances, Miss Gibson said there was still need for a cooker which combined fuel efficiency with the good points of the old black range which had, at least, generous top space, large ovens, and the capacity to cook for a large family.

Golden Jubilee of a Family Concern

William Bailey, Limited, brassfounders, of Birmingham and Halesowen, celebrated their 50th anniversary on November 12 with a dinner at which presentations were made to 104 employees whose aggregate years of service totalled some 1,600 yrs. The presentations were made by Mr. E. Withington, chairman of the company, and by Mr. Herbert Bailey, a life director. The firm was founded in 1902 in a small workshop off Broad Street, Birmingham, by Mr. William Bailey, a die-sinker and toolmaker. He was joined by his brothers, Herbert and Harold, and all three ultimately became life directors. Six other brothers, George, Sam, Robert, Roland, Harry and Frank and two sisters, Mrs. E. Manning and Miss May Bailey, joined the firm and all were included in the deed of partnership drawn up in 1910. In 1907 Mr. Leonard Bailey, son of William Bailey, joined the firm at the age of 17, later becoming secretary. He is now joint managing director with Mr. Tom Withington.

Frequent changes of premises marked the firm's expansion, from Broad Street to Guest Street, Hockley, and from there to Harford Street; in 1910, to Brearley Street and to the present site in 1917. The concern was incorporated as a private company in 1923 when Mr. E. Withington, the present chairman, joined the company. The firm manufactures hot-brass stampings and light aluminium alloys. When the Weaman Street premises were bombed during the last war a dispersal factory was opened at Halesowen. Today the labour force is approximately 250 and the range of products very wide.

Auckland Harbour Bridge

The Auckland Harbour Bridge Authority, New Zealand, have accepted the joint tender of two British firms—the Cleveland Bridge & Engineering Company, Limited, of Darlington, and Dorman, Long & Company, Limited, of Middlesbrough—for the construction of a new road bridge at Auckland. This was the only British tender submitted and had to meet strong foreign competition, particularly from Continental bridge-builders. The value of the contract is £4,236,000. Each of the firms will fabricate approximately half of the steelwork and will work in association on the construction of the foundations and erection of the superstructure. The weight of steel in the bridge is approximately 10,000 tons. It is anticipated that the bulk of this will be rolled in Dorman, Long mills.

Iron and Steel Institute

The twentieth meeting of the iron and steel engineers group of the Iron and Steel Institute will be held at 4, Grosvenor Gardens, London, S.W.1, on December 11, and a buffet luncheon will be held in the library in connection with the meeting. The detailed programme includes the following Papers: "Trials of an Experimental Austeel-Escher Metallic Recuperator," by J. B. Davis, W. Ernest, and H. Kay; "Experiences with the Escher Metallic Recuperator on High-temperature Furnaces," by H. Escher; "Heat Recovery in Industrial Furnaces," by A. Clift and C. Knight, and "Some Factors Affecting the Operation and Performance of Open-hearth Furnaces," by D. F. Marshall, Ph.D.

Those wishing to attend the meeting are asked to complete and return reply forms by December 5.

International Nickel's Earnings

The interim report of the International Nickel Company of Canada, Limited, and subsidiaries for the nine months ended September 30, 1952, issued by Dr. John F. Thompson, chairman, shows net earnings in terms of U.S. currency of $45,683,360 after all charges, depreciation, depletion, taxes, etc., equivalent after preferred dividends, to $3.03 per share on the common stock. For the corresponding period in 1951 the net earnings were $45,734,860, also equivalent to $3.03 per share. Net sales for the nine months were $228,915,593, compared with $203,253,035 for the corresponding period of 1951. In the three months ended September 30, 1952, net earnings were $12,145,133, equal to 80 cents a share, compared with $16,349,814, or $1.09 per share, for the corresponding quarter of 1951. Net sales for the quarter were $71,199,789, against $71,685,498 for the corresponding quarter of last year.

In an accompanying message to shareholders on the company's development and research activities, Dr. Thompson said that since its formation the company had felt it both an obligation and an opportunity to expand constantly its knowledge of the properties of nickel, copper, the platinum metals, and their alloys, and to make this information broadly available to industry.

New alloys and new information on old alloys had come out of the company's laboratories in Canada, the United States, and the United Kingdom. The combined results of research on nickel by the company and industry throughout the world, Dr. Thompson said, were reflected in the increase in the free world's consumption of the metal in the past quarter century. Paralleling this increased demand, the company's output of nickel during this period had risen from about 65,000,000 lb. to approximately 250,000,000 lb. annually.

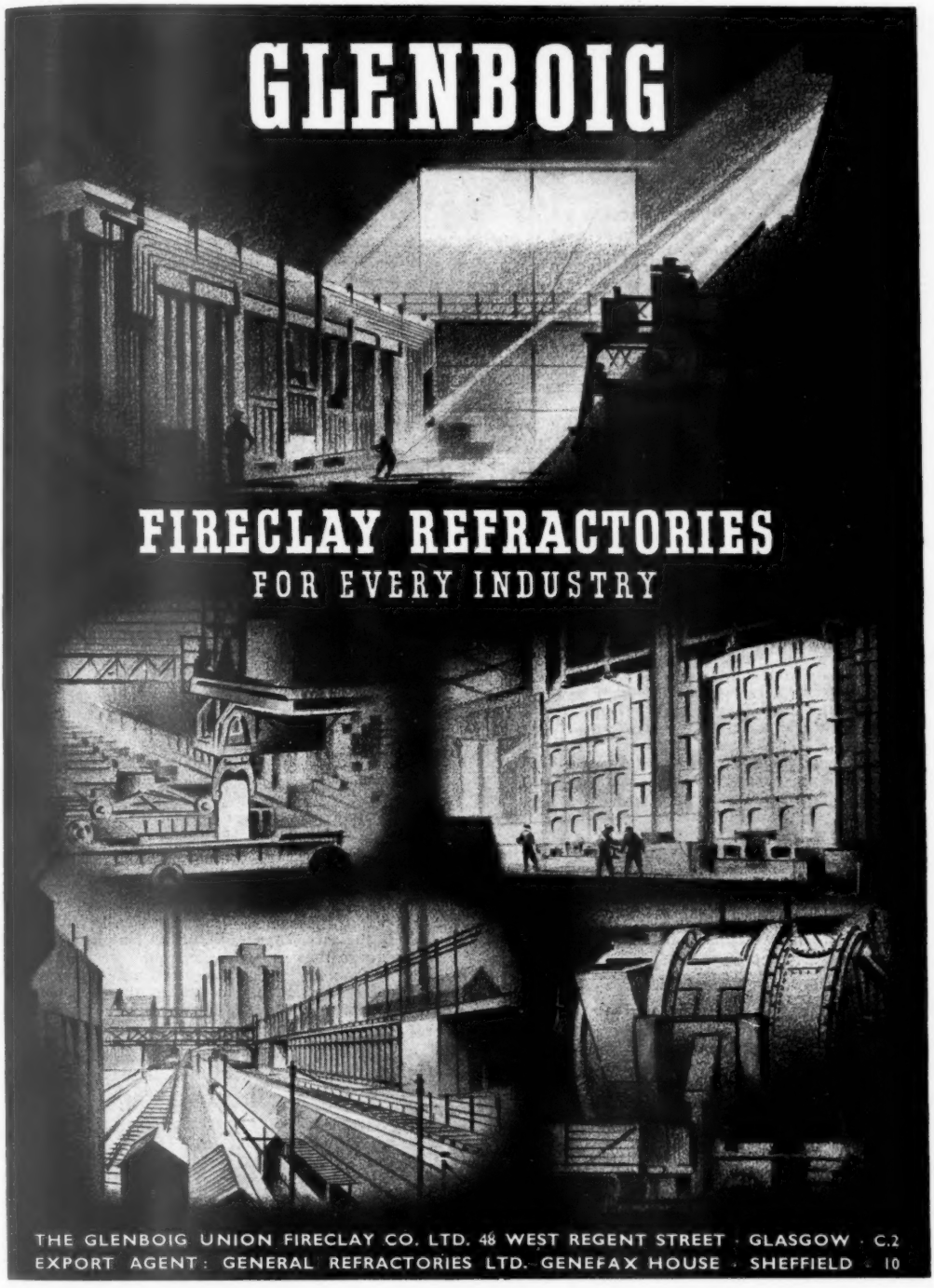
Scottish Ironfounders Discuss Design

Scotland's principal ironfoundry firms were represented at a conference in Glasgow on design policy in the industry, which was organized by the Council of Industrial Design Scottish Committee last week. Questions of the employment and training of designers in an industry which ranges from lamp-posts, cookers, fireplaces and heating stoves predominated in discussions based on four papers delivered to the conference.

The first was given by Mr. G. H. Lawrence, A.R.I.B.A., A.M.T.P.I., F.R.I.A.S., T.D., of the Department of Health for Scotland, on the architectural background to the ironfounder's work. Mr. Leslie Julius, of Hille & Company, Limited, London, spoke about his own experience in applying a design policy in the furniture industry. The designer's point of view on relationships between designers and manufacturers was given by Mr. Misha Black, O.B.E., F.S.I.A., M.INST.R.A, of the Design Research Unit, London. Prof. R. E. Baker, A.R.C.A., of the Royal College of Art, London, spoke on the training of designers in collaboration with a particular industry.

The conference was conducted under the chairmanship of Mr. T. Coughtrie, of the Belmos Company, Limited, Bellshill, and has been called at the request of leading members of the industry.

AS FROM DECEMBER 1 NEXT, the London office of Robert Hudson, Limited, railway equipment manufacturers, etc., of Leeds, will be at 47, Victoria Street, S.W.1. The telephone number will be changed to Abbey 7127 and the telegraphic address to "Raletrux Sowest."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Correspondence—continued from page 610

The Council of Ironfoundry Associations being a federation of associations, has no direct membership of individual firms. Each member association sends one or more representatives to the Council and voting on the Council is by associations. The effective channel of communication on policy matters between the Council and the individual member firm is through the association representatives on the Council, the autonomy of each member association being thus preserved. During this period, and up to the publication of the White Paper in July, 1952, each association acted in accordance with its own judgment in respect of the extent to which the essential features of the negotiations could be communicated to its own executive body or to its members generally. In addition, the director held a meeting with the secretaries of the member associations in April, 1952, when he reviewed the developments up to that date. A summary of the position was included in the C.F.A. Annual Report for 1951, copies of which were distributed to all member firms in the first week in May, 1952.

On publication of the White Paper on July 28, 1952, copies were sent the same day to all Council members and association secretaries and a short review appeared in C.F.A. Bulletin No. 70, sent to all member firms a day or so later. In addition, of course, the White Paper was extensively reviewed in the national and technical Press so that all ironfounders could reasonably be assumed to be aware of at least the main proposals and in particular the inclusion of iron castings in the schedule of activities to be supervised.

Owing to the holiday period, consideration of the White Paper by the Council was deferred until the September quarterly meeting, the Government having signified its intention to defer presentation of the Bill so as to allow time for consideration of the White Paper and for submission of representations as to its contents.

During the intervening weeks, a number of member associations held meetings to discuss the White Paper and the C.F.A. policy was expounded by the representatives on the Council. During this period no expressions of dissent either on the part of member associations or of member firms were received at the C.F.A. offices. At the Council meeting on September 18, the C.F.A. policy was re-affirmed; this was, in effect, not to oppose the inclusion of iron castings as such, but to make appropriate representations as to the specific provisions of the Bill when these became known.

At the Joint Iron Council Convention on October 9, it was not possible to reach unanimity among the members present, and it was decided to refer the matter back for further consideration, first by C.F.A. Council and subsequently by member associations.

At a special meeting of the C.F.A. Council held on October 30, the C.F.A. policy was endorsed by a substantial majority and the Minister was informed accordingly by the Joint Iron Council. At the same time representations were made to him for:—(*a*) Exclusion of iron castings from price control by the Board, and (*b*) inclusion of a member on the Board with wide experience of ironfounding. At a subsequent meeting with the Minister these points in the Bill have been further argued and additional representations made, as follow:—

1(*a*) *Clause* 5. That consideration be given to the more precise definition of the class of development proposals for which the Board's consent is to be required in the light of the Minister's statement in the House of Commons on October 23, 1952, that he believed that few, if any, foundry development schemes would come into that category.

(*b*) *Clause* 31. That the definition of production facilities be re-examined as to the possibility of excluding plant or machinery from the definition.

(2) *Clause* 13 (power of Board to obtain information). That this Clause be deleted or drastically modified so as to remove or limit the power of the Board to demand information under penalties.

The Council has asked all member associations to notify it of suggested amendments to the Bill. These will be considered by a special committee appointed by the Council for the purpose.

Conclusion.—The Council as the representative national body of the ironfounding industry now asks for the support of all ironfounding firms to its policy of endeavouring to secure the vital interests of the industry within the terms of the Bill, in the belief that the unity of the industry is its greatest source of strength for the future.—Yours, etc.,

N. P. NEWMAN (Chairman),
J. D. CARMICHAEL (Vice-chairman),
H. V. SHELTON (Vice-chairman).

Crusader House,
14, Pall Mall,
London, S.W.1.
November 21, 1952.

Induction Furnaces

G.W.B. Electric Furnaces, Limited, of Reliance Works, Dudley, Worcs, have entered into an agreement with S.P.A. Forni Elettrici A. Tagliaferri, of Milan, to market normal-frequency, core-type induction melting furnaces. The range includes standard furnaces for melting aluminium and other light alloys, copper alloys, and also for cast iron. In addition, furnaces are available for zinc distillation in a closed furnace chamber. The melting is carried out in a channel surrounding a primary winding, a ring of molten metal forming the secondary winding of a 50-cycle transformer.

The melting furnaces for cast iron have been specially developed to work by duplexing with normal cupolas for producing high-grade refined irons. Such furnaces can also be used for producing alloy irons and nodular cast irons, whilst cast-iron swarf and small scraps can be recovered in these induction furnaces with a small metal loss. For feeding die-casting machines, and for hand-ladle pouring, melting furnaces for aluminium and brass are of the twin chamber bale-out type. All furnaces are arranged for either hand, mechanical or hydraulic tilt and, in the case of the larger types, a special feature lies in the ability to remove the bath and inductor slots for relining without disturbing the transformer itself or the electrical connections. This means that a spare bath can be held re-lined ready for immediate use.

Federation of Secondary Light Metal Smelters

Mr. F. Farenden presided over the annual dinner of the Federation of Secondary Light Metal Smelters, held last Thursday at the Trocadero, London. The guests included Mr. G. B. Garnham, Mr. Edward Player, Mr. V. P. Harries, Mr. H. E. Thatcher, Mr. A. Myers, Mr. L. J. Chandler, Mr. R. T. Priestman, Mr. H. R. Murray Shaw, Mr. C. E. Keey, Mr. G. A. Woodruff, and Mr. V. C. Faulkner, most of whom were accompanied by their ladies. After dinner, the guests were entertained by Erikson—a magician, and Helen Ward, soprano. The organization was carried through by Mr. Ross, secretary of the Association.

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Raw Material Markets

Iron and Steel

Business prospects for foundries generally are poor. The engineering foundries catering for the motor, tractor, and Diesel engine trades particularly are feeling the effects of the trade recession, and in some cases production has declined to between 50 and 75 per cent. of normal. Makers of castings for agricultural implements and the textile trade, together with light foundries producing castings for household equipment, are similarly affected. Although the loss in their normal trade is compensated in some measure by armament work, business on hand is generally insufficient to keep plants fully operative.

The foundry grades of pig-iron are, in the main, sufficient for current needs, but, even with reduced demands, there is not a large surplus and stocks are not augmented to any extent either at the furnaces or the foundries. The producers of the low- and medium-phosphorus irons and hematite are able to dispose of their outputs, while the reduced tonnages of high-phosphorus irons do not exceed the requirements of the light and jobbing foundries. The makers of the high-phosphorus grades have indicated that, in the latter half of December or early in the New Year, outputs are expected to show an appreciable improvement. Supplies of scrap for the foundries have improved, but there is still a keen demand for heavy machinery and ordinary heavy cast-iron scrap.

Foundry coke is received in sufficient quantities for current needs, and most foundries have been able to build up a working stock, which is necessary at this period of the year. Ganister, limestone, and firebricks are received to requirements.

The re-rollers continue to be fairly well employed, mostly on orders for home consumers; the sheet re-rollers, however, who have heavy order-books for both home and export markets, as their oversea prices are competitive with foreign makers. The export market for merchant bars is negligible, and there is little prospect of any revival in this trade unless British prices are much reduced; foreign producers are quoting about £10 per ton less than U.K. prices. Supplies of steel semis are none too plentiful for many re-rollers, particularly those in the Birmingham area. They are unable to obtain increased tonnages from home steelworks and deliveries from abroad are not being received regularly. All arisings of defectives and crops are readily accepted.

Non-ferrous Metals

Following weakness in the U.S. lead market, where the current quotation for supplies was reduced by ¼ cent to 14¼ cents per lb. and the price of futures on the Commodity Exchange weakened considerably, the tone of the London market was decidedly easier. Last week it was reported in New York that arrangements were afoot for the United States Government to purchase a large tonnage of lead from Britain for its emergency stockpile. Such action, it was contended, would give considerable support to the London market and the supposition was not unreasonable. In the event, however, there was no sign of any special buying in Whittington Avenue, and confirmation of the report being lacking, the whole affair proved to be something of a damp squib. As already mentioned, the U.S. lead quotation eased off and for the moment the outlook is rather bearish. Consumers are buying cautiously and are disinclined to commit themselves far ahead. In tin, however, the tone was better.

Official prices for refined pig-lead were:—

November—Thursday, £93 5s. to £93 10s.; Friday, £89 to £89 5s.; Monday, £90 10s. to £90 15s.; Tuesday, £90 15s. to £91; Wednesday, £90 15s. to £91.

February—Thursday, £93 5s. to £93 10s.; Friday, £89 to £89 5s.; Monday, £90 10s. to £90 15s.; Tuesday, £90 15s. to £91; Wednesday, £90 15s. to £91.

Official tin quotations were as follow:—

Cash—Thursday, £968 10s. to £969; Friday, £962 10s. to £963; Monday, £961 10s. to £962; Tuesday, £962 to £963; Wednesday, £965 10s. to £966.

Three Months—Thursday, £948 to £949; Friday £943 to £944; Monday, £944 to £944 10s.; Tuesday, £944 to £945; Wednesday, £946 10s. to £947 10s.

On November 20, a Ministry of Materials announcement confirmed that sufficient progress had been made in its discussions with the parties concerned to allow a definite statement that free trading in zinc would be resumed on the Metal Exchange on January 2, the first day of the New Year being a holiday by old custom. The Government statement emphasizes that in regard to stocks disposal, its policy will be "to release not more than a relatively small tonnage for sale during the early months after the resumption of private trading." On the other hand, an assurance has been given that enough zinc will be made available through the exchange and through other normal trade channels to take care of consumers' requirements. The Ministry has stated that the arrangements for the marketing of stocks have been discussed fully with producers, consumers and members of the London Metal Exchange. There certainly ought to be enough zinc for everybody, as the Government's holding has been growing steadily throughout the year and by December 31 is likely to stand at a very substantial figure.

Shipbreaking Boom on the Clyde

Clyde shipbreakers, who have been having a lean time since the end of the war because the life of merchant ships was extended to meet the tense international situation, are now in the midst of a minor boom. Within the next two or three weeks, more vessels will be in the shipbreakers' yards than at any time since the war, and the flow of much-needed scrap for the Lanarkshire steel mills will be stepped up. Besides the 15,000-ton Orient liner Ormonde, due at Dalmuir early next month, two other vessels will shortly arrive in the Clyde for scrapping. This week Metal Industries, Limited, at Faslane, expected to receive the 7,150-ton French liner Ville de Strasbourg, which was being towed from Marseilles. They have also been allocated the 11,221-ton troopship Empire Medway, formerly the Eastern Prince, which has been up for sale for some months by the M.O.T. and has been laid up in the Kyles of Bute. From the same source, the Faslane firm recently received the former C.P.R. liner Montcalm, which is now in the early stages of demolition.

Last week, the West Riding of Yorkshire branch of the Institute of British Foundrymen held their annual dance at the Alexandra Hall, Halifax, when the branch president entertained the national president, Dr. C. J. Dadswell, and Mrs. Dadswell, as well as Mr. T. Makemson, M.B.E., the general secretary. The secretary of the Sheffield branch and his wife, Mr. and Mrs. J. H. Pearce, also attended.

Remember the old Proverb!

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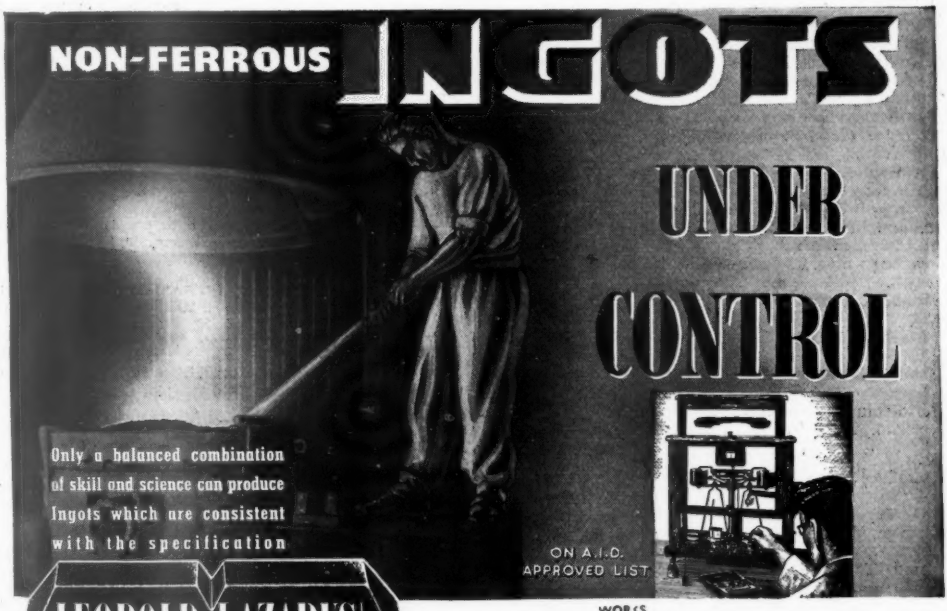
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Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered, unless otherwise stated)

November 26, 1952

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2:—Middlesbrough, £13 1s. 6d.; Birmingham, £12 15s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £16 8s., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £15 5s. 9d.

Scotch Iron.—No. 3 foundry, £15 19s. 6d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £17 14s. 6d. South Zone, £17 17s.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £18 14s. 6d.; South Zone, £18 17s.

Cold Blast.—South Staffs, £18 2s.

Hematite.—Si up to 2½ per cent., S. & P. over 0.03 to 0.05 per cent.:—N.-E. Coast and N.-W. Coast of England, £16 2s.; Scotland (Scotch iron), £16 8s. 6d.; Sheffield, £17 3s.; Birmingham, £17 9s. 6d.; Wales (Welsh iron), £16 8s. 6d.

Basic Pig-iron.—£13 19s. all districts.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered.)

Ferro-silicon (6-ton lots).—40/55 per cent., £57 10s., basis 45% Si, scale 21s. 6d. per unit; 70/84 per cent., £86, basis 75% Si, scale 23s. per unit.

Ferro-vanadium.—50/60 per cent., 22s. per lb. of V.

Ferro-molybdenum.—65/75 per cent., carbon-free, 10s. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, £204; ditto, copper-free, £212.

Ferro-tungsten.—80/85 per cent., 27s. 6d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 30s. 8d. per lb. of W.

Ferro-chrome (6-ton lots).—4/6 per cent. C, £85 4s., basis 60% Cr, scale 28s. 3d. per unit; 6/8 per cent. C, £80 17s., basis 60% Cr, scale 26s. 9d. per unit; max. 2 per cent. C, 2s. per lb. Cr; max. 1 per cent. C, 2s. 2½d. per lb. Cr; max. 0.15 per cent. C, 2s. 3½d. per lb. Cr; max. 0.10 per cent. C, 2s. 3¾d. per lb. Cr; max. 0.06 per cent. C, 2s. 4d. per lb. Cr.

Cobalt.—98/99 per cent., 20s. per lb.

Metallic Chromium.—98/99 per cent., 6s. 5d. to 6s. 9d. per lb.

Ferro-manganese (blast-furnace). — 78 per cent., £49 0s. 8d.

Metallic Manganese.—93/95 per cent., carbon-free, £262 per ton.

Ferro-columbium.—60/75 per cent., Nb + Ta, 40s. to 60s. per lb., Nb + Ta.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft, u.t., £25 4s. 6d.; tested, 0.08 to 0.25 per cent. C (100-ton lots), £25 14s. 6d.; hard (0.42 to 0.60 per cent. C), £27 12s.; silico-manganese, £33 8s.; free-cutting, £28 8s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £31 9s.; case-hardening, £31 17s.; silico-manganese, £34 9s. 6d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £29 8s.; basic, hard, over 0.41 up to 0.60 per cent. C, £30 8s.; acid, up to 0.25 per cent. C, £31 17s.

Sheet and Tinplate Bars.—£25 3s. 6d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £29 14s.; boiler plates (N.-E. Coast), £31 1s. 6d.; chequer plates (N.-E. Coast), £31 3s.; heavy joists, sections, and bars (angle basis), N.-E. Coast, £27 17s.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., untested, £31 15s. 6d.; flats, 5 in. wide and under, £31 15s. 6d.; hoop and strip, £32 10s. 6d.; black sheets, 17/20 g., £41 12s. 6d.; galvanized corrugated sheets, 24 g., £52 9s.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £50 18s. 3d.; nickel-chrome, £71 7s. 9d.; nickel-chrome-molybdenum, £79 2s. 6d.

Tinplates.—67s. 1½d. per basis box.

NON-FERROUS METALS

Copper.—Electrolytic, £285; high-grade fire-refined, £284 10s.; fire-refined of not less than 99.7 per cent., £284; ditto, 99.2 per cent., £283 10s.; black hot-rolled wire rods, £294 12s. 6d.

Tin.—Cash, £965 10s. to £966; three months, £946 10s. to £947 10s.; settlement, £966.

Zinc.—G.O.B. (foreign) (duty paid), £110; ditto (domestic), £110; "Prime Western," £110; electrolytic, £114; not less than 99.99 per cent., £116.

Lead.—Refined pig-lead: November, £90 15s. to £91; February, £90 15s. to £91.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £130 15s.; rolled zinc (boiler plates), all English destinations, £128 15s.; zinc oxide (Red Seal), d/d buyers' premises, £136.

Other Metals.—Aluminium, ingots, £166; magnesium, ingots, 2s. 10½d. per lb.; antimony, English, 99 per cent., £225; quicksilver, ex warehouse, £70 10s. to £71; nickel, £454.

Brass.—Solid-drawn tubes, 26½d. per lb.; rods, drawn, 37d.; sheets to 10 w.g., 31½d.; wire, 32½d.; rolled metal, 29½d.

Copper Tubes, etc.—Solid-drawn tubes, 32½d. per lb.; wire, 317s. 9d. per cwt. basis; 20 s.w.g., 346s. 3d. per cwt.

Gunmetal.—Ingots to BS. 1400—LG2—1 (85/5/5/5), £195 to £218; BS. 1400—LG3—1 (86/7/5/2), £207 to £238; BS. 1400—G1—1 (88/10/2), £320 to £375; Admiralty GM (88/10/2), virgin quality, £335 to £380 per ton, delivered.

Phosphor-bronze Ingots.—P.Bl, £350 to £385; L.P.Bl, £250 to £275 per ton.

Phosphor Bronze.—Strip, 44d. per lb.; sheets to 10 w.g., 46½d.; wire, 49½d.; rods, 44½d.; tubes, 42½d.; chill cast bars: solids 4s. 2d., cored 4s. 3d. (C. CLIFFORD & SON, LIMITED.)

Nickel Silver, etc.—Ingots for raising, 2s. 9½d. per lb. (7%) to 3s. 10½d. (30%); rolled metal, 3 in. to 9 in. wide × .056, 3s. 3½d. (7%) to 4s. 4½d. (30%); to 12 in. wide × .056, 3s. 3½d. to 4s. 4½d.; to 25 in. wide × .056, 3s. 5½d. to 4s. 6½d. Spoon and fork metal, unsheared, 3s. 0½d. to 4s. 1½d. Wire, 10g., in coils, 3s. 9½d. (10%) to 4s. 10½d. (30%). Special quality turning rod, 10%, 3s. 8½d.; 15%, 4s. 2d.; 18%, 4s. 6½d. All prices are net.